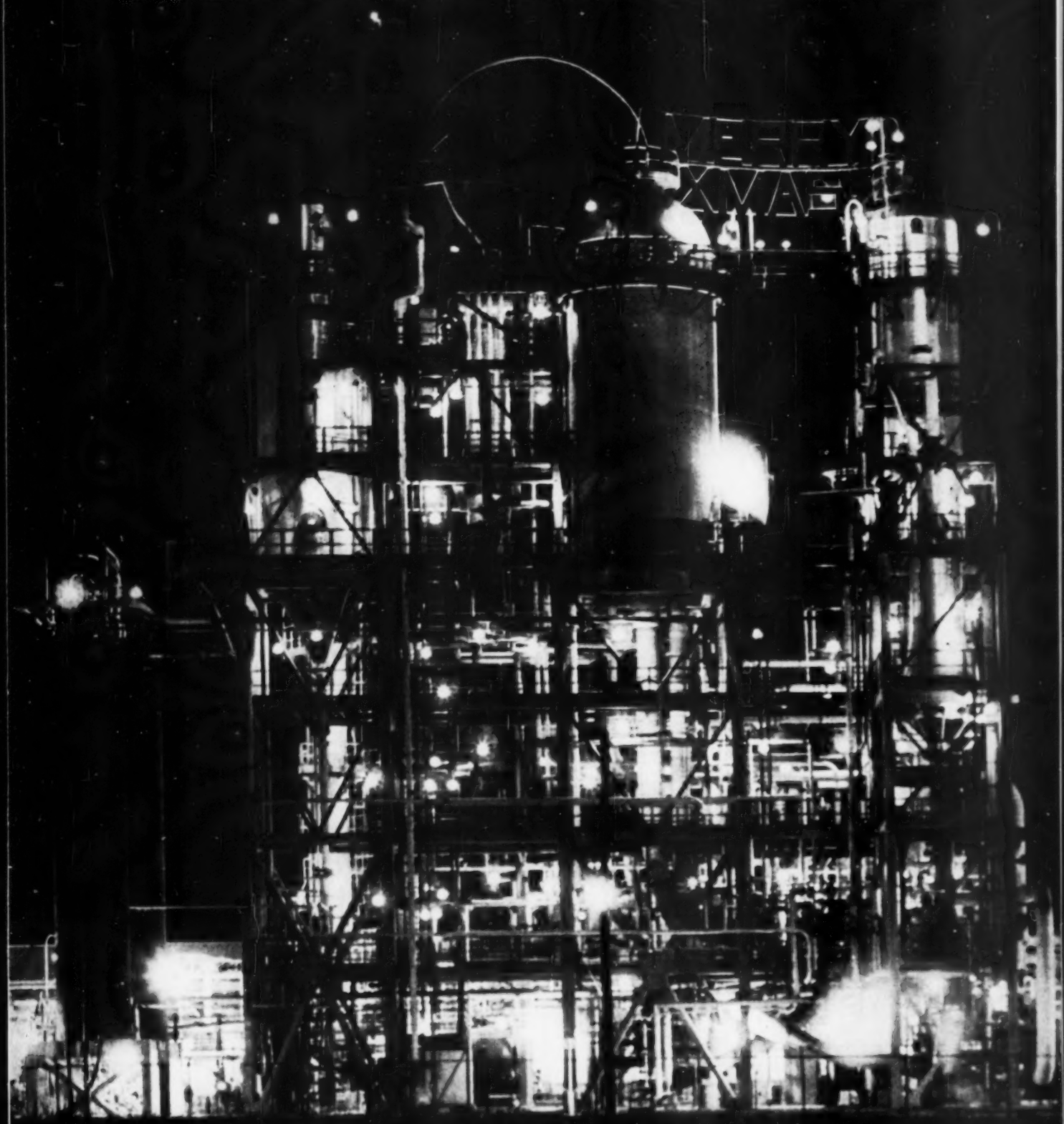
World Petroleum



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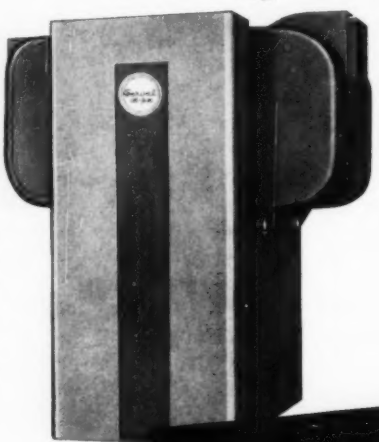

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. . . and Servel Refrigerators meet your conditions best, too. In the tropics . . . in the desert . . . *anywhere* . . . Servel keeps foods fresh, cools beverages, and makes plenty of ice cubes. For, like the ALL-YEAR Air Conditioner, the Servel Refrigerator operates on gas (butane, propane, natural or manufactured) . . . or kerosene. So there's no motor to wear . . . no moving parts in the freezing system to break down and need repair. Many of the more than 2,500,000 Servels in use throughout the world today have been functioning as long as 20 years.

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This is a full-size car with 104" wheelbase and sturdy all-steel body mounted on a newly engineered 4-wheel-drive chassis. It has ample clearance for rough travel. The flat open fenders give ready access to the wheels and make it easier to service tires or put on chains.

The 4-wheel-drive Willys Station Wagon is roomy and comfortable—with seats for six and space in the rear for a big load of tools and equipment. This load space is easily increased to 98 cubic feet by removing the rear seats. The end gate can be lowered to provide still more room for hauling bulky objects.

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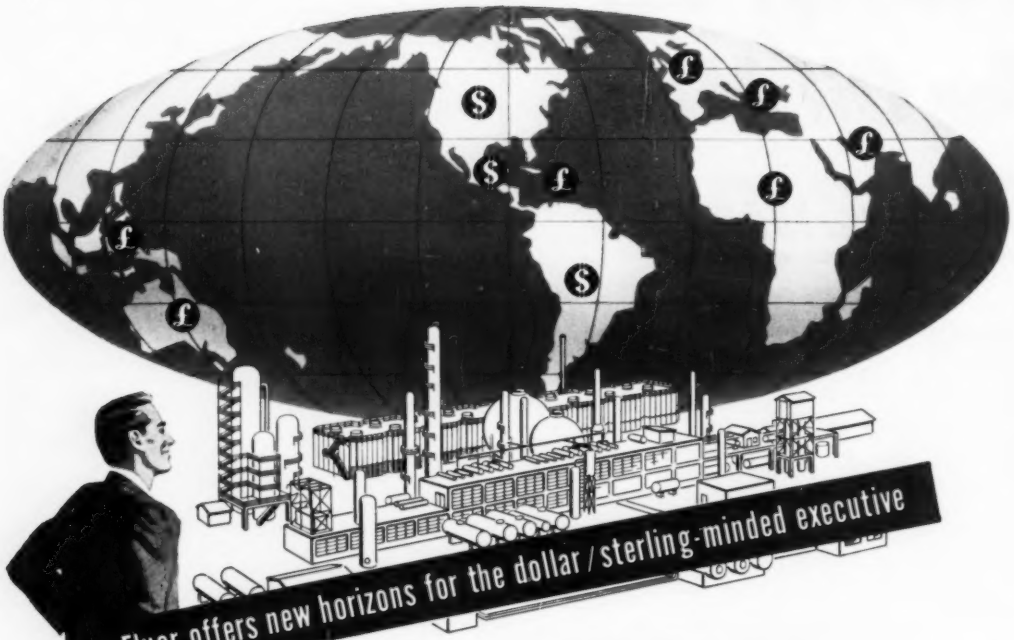

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TO FACILITATE the building of petroleum, chemical and auxiliary plants in the sterling and other areas, The Fluor Corporation, Ltd., is pleased to announce its association with Head Wrightson Processes Ltd., a British Engineering Organization, currently engaged in the engineering, supply and erection of units for Light Oil and Crude Oil Fractionation, Gas Separation, Solvent Extraction, Chemical Treating, Utilities Supply, Carbon Black Production, etc., within the British Commonwealth and other countries.

Unlimited Facilities... The agreement between The Fluor Corporation, Ltd., and Head Wrightson Processes Ltd. opens new fields for capital investment in the sterling and other areas by making available...

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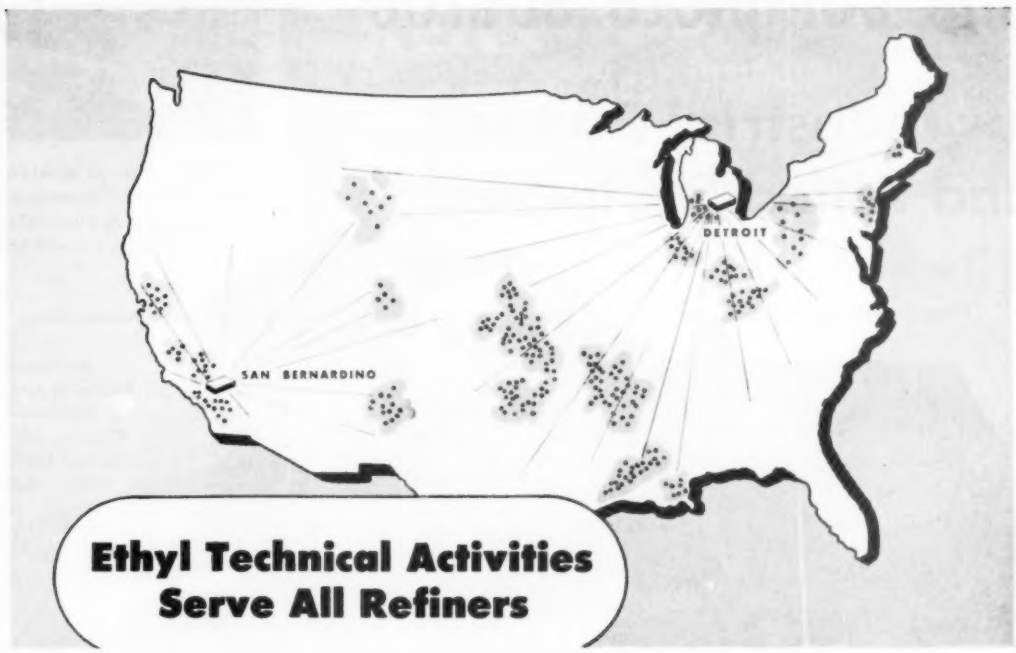

Ethyl Technical Activities Serve All Refiners

1. Improving "Ethyl" Antiknock Fluids

For more than 26 years Ethyl has conducted continuous and intensive research to improve the quality and reduce the cost of "Ethyl" antiknock compounds. Seven new and better antiknock fluids for motor gasolines have resulted in a substantial reduction in formulation cost which, along with savings in manufacture, has been reflected in lower prices to the oil industry.

2. Preventing Engine-Fuel Problems

After gasoline has been made, it must operate satisfactorily in many types of engines. Working with the manufacturers, the Ethyl Laboratories make every effort to help correct, before production, any features of engine design not likely to be compatible with the products offered by refiners.

3. Creating Mechanical Octane Numbers

Convinced that Ethyl's interests are inseparable from those of its customers, the Laboratories render an indirect but important service to oil companies by developing features of engine design which improve power and economy without requiring higher antiknock quality. Work is done on improvement of combustion chambers, and manufacturers are assisted in the development of intake manifolds which provide faster warm-up and better distribution of fuel to the cylinders.

4. Multiplying the Benefits of Research

The value of information developed by research is not lost through usage, but becomes more valuable as more people employ it. Without Ethyl's broad research program, individual oil companies might find it necessary to carry on many of the expensive research services now conducted by Ethyl.

It is Ethyl's objective to have its research program ensure that the addition of "Ethyl" antiknock fluids to refiners' gasolines will give the maximum improvement in quality, and that the resulting fuel will give the most satisfactory performance in service.

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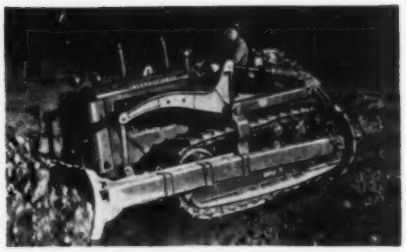
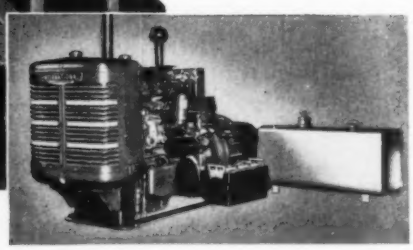


Work horse of the oil fields! Here that all 'round power team, an International TD-18 Diesel Crawler with Bucyrus-Erie Bulldozer, fills in old slush pits with speed and economy.

An Isaacson Klearing Blade backed by a rugged, dependable International TD-18 Diesel Crawler, fells trees, combs out roots and boulders, makes short work of the toughest landclearing jobs.



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THE RIGHT POWER and the right equipment to do the work—that's the team that pays economy and performance dividends in the oil fields. That's why so many operators take their problems to their International Industrial Power Distributor. Here is *one, single responsible source for:* 1—International Tractors. 2—International Power Units. 3—Complete Matched Allied Equipment. 4—Parts and Service for both International Power and Allied Equipment.

International Crawlers and Power Units can handle any job, big or small . . . and do it *economically!* Remember, International job-proved dependability is there from start to finish on every oil field operation where this complete line of matched allied equipment is used. So see your International Industrial Power Distributor for facts now.

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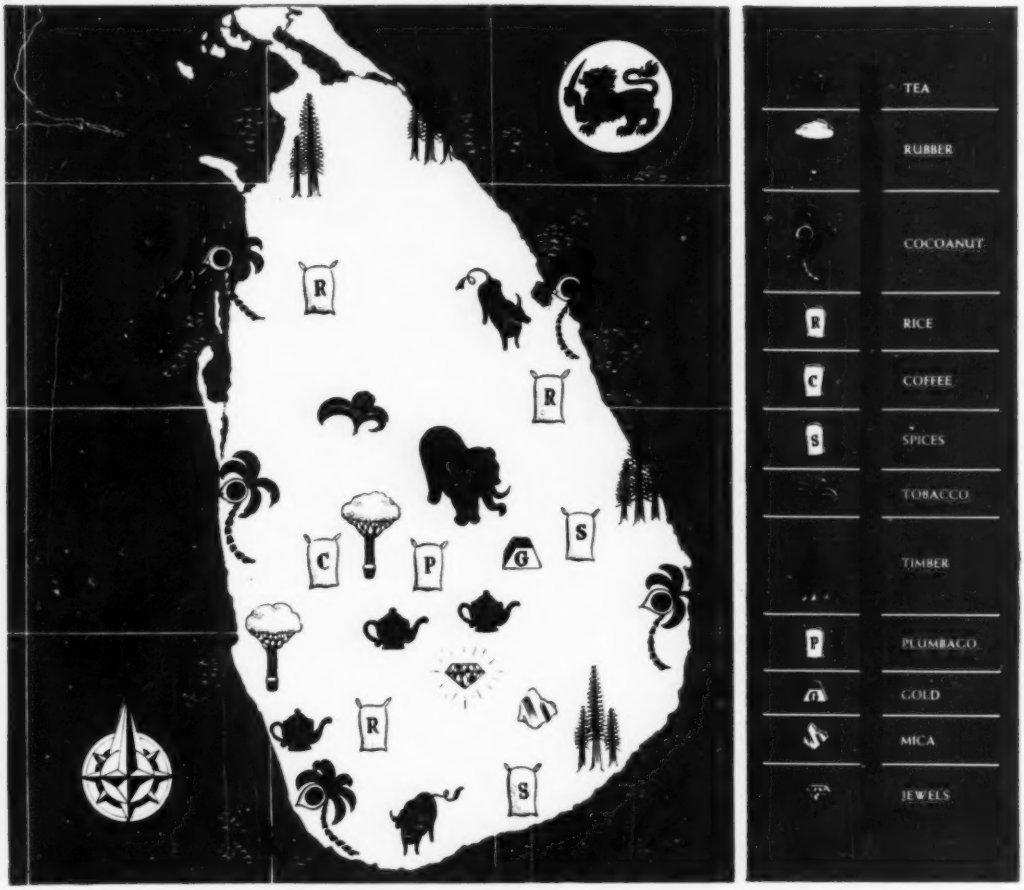

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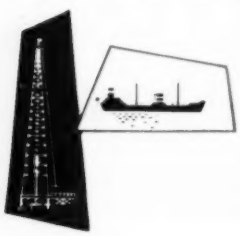
Standard-Vacuum is proud of the part it plays in supplying the petroleum products so essential to the welfare and continued growth of Ceylon.



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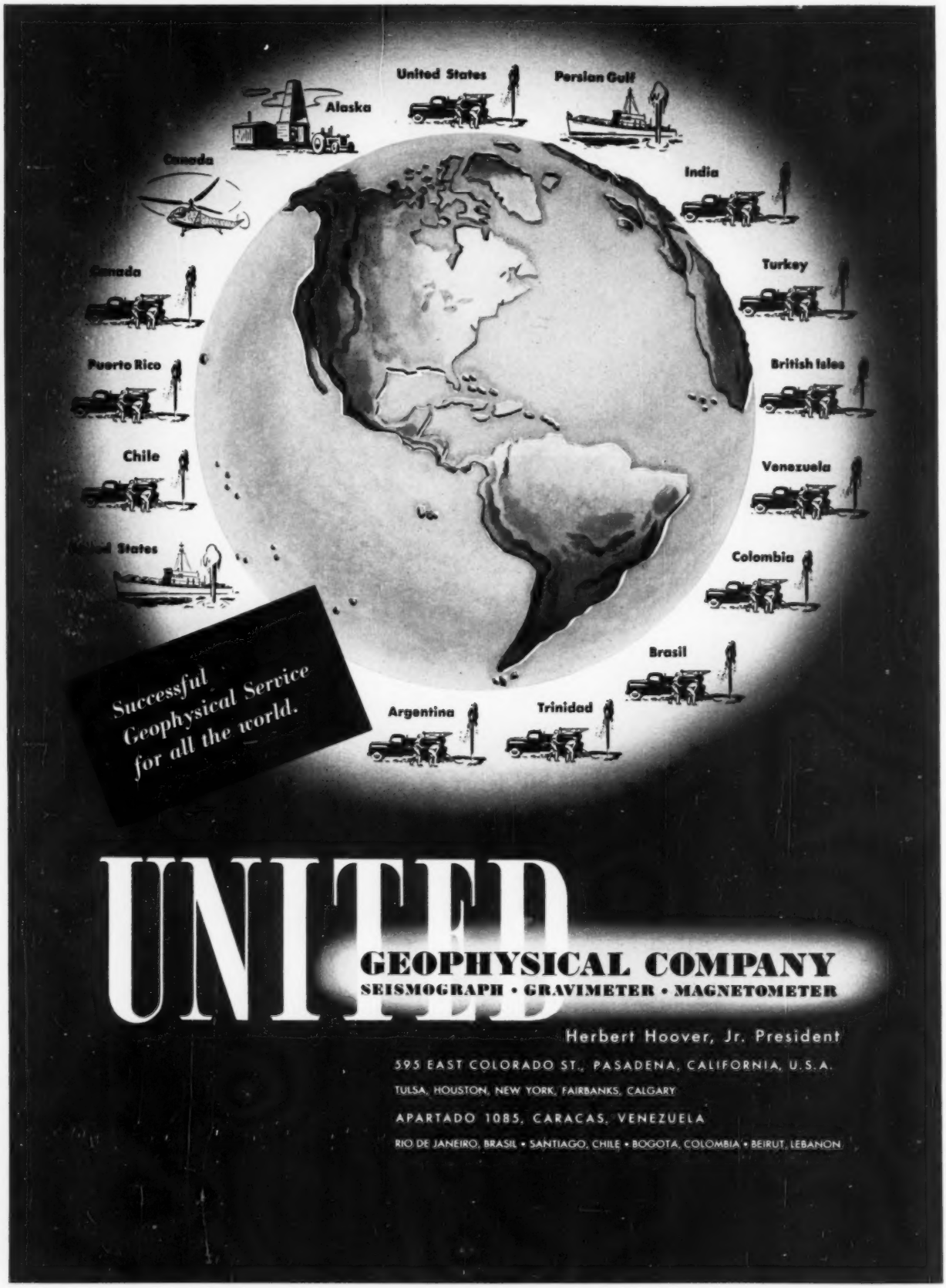
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See special "Canadian Oil Sands" story this issue.

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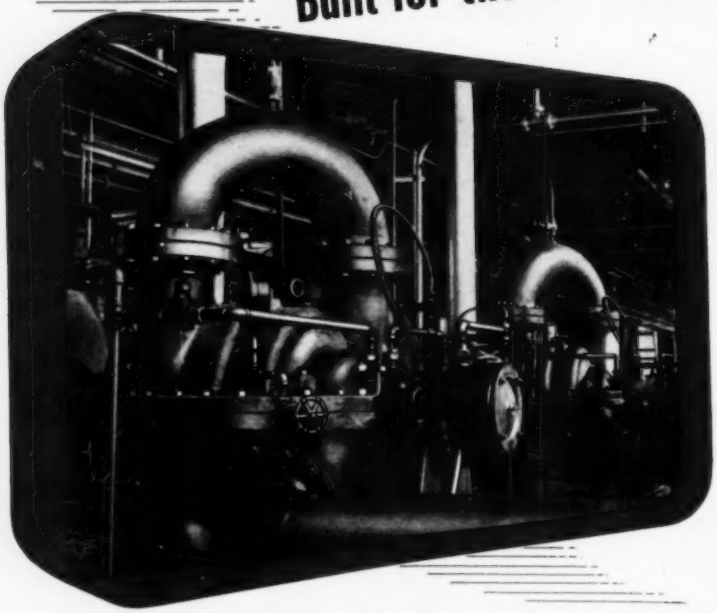

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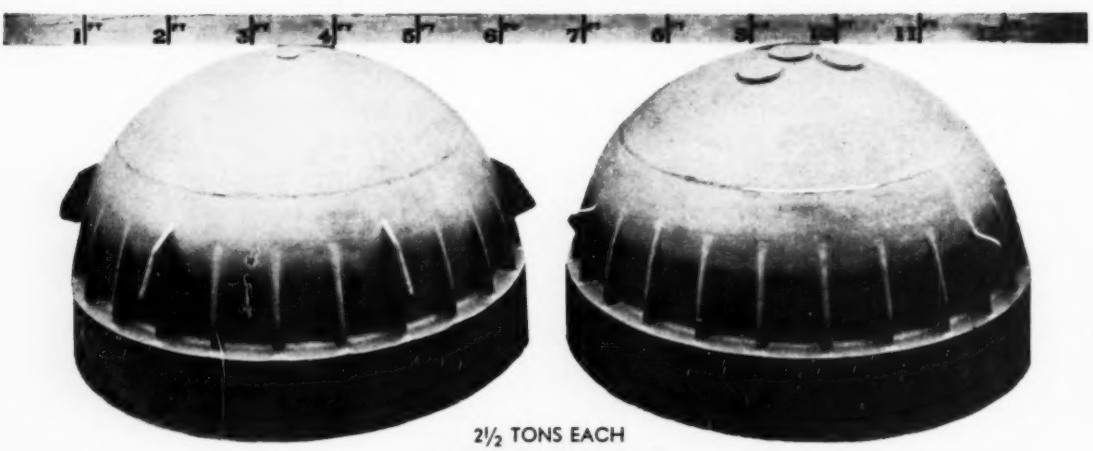

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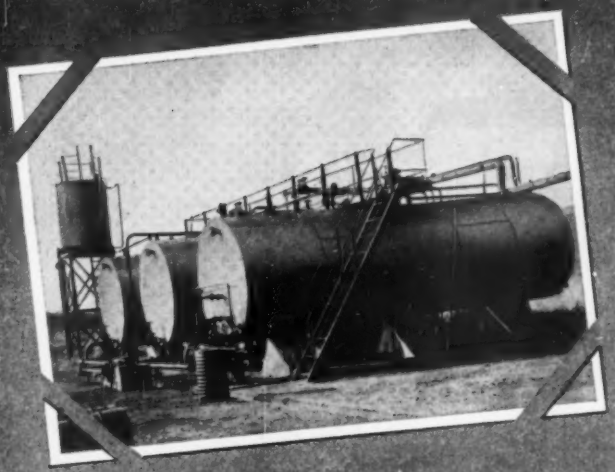
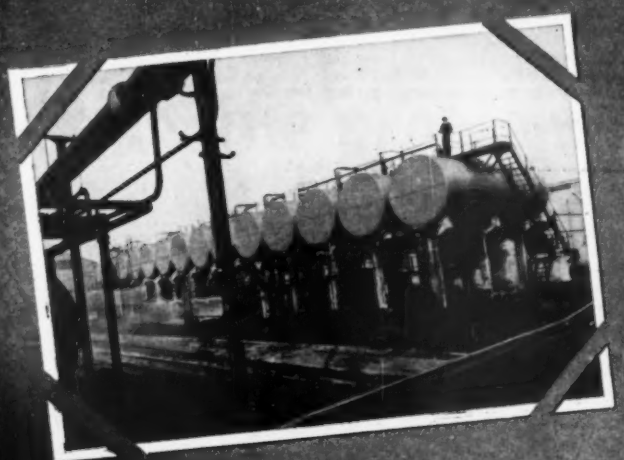


OXLEY WELDED STORAGE TANKS

for the Lobitos Oilfields Ltd.



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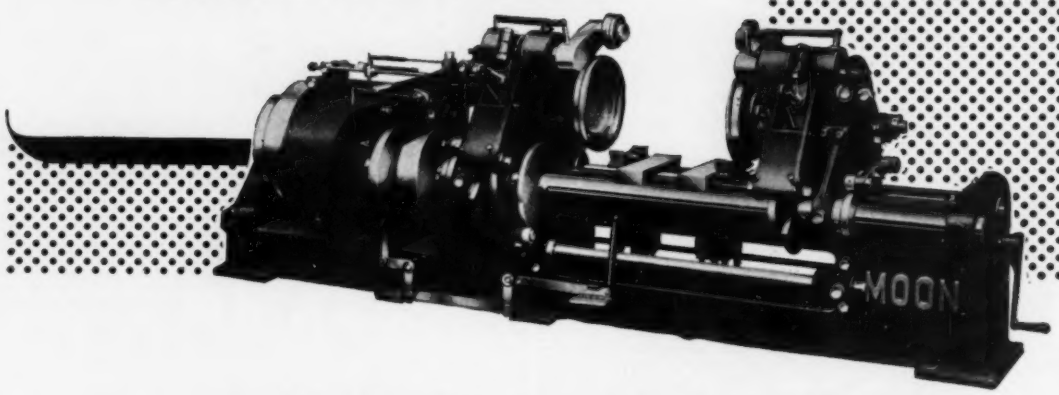

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For consistent high quality in mass producing standard small drums, this machine with its capacity of 450 drums per hour is without equal.

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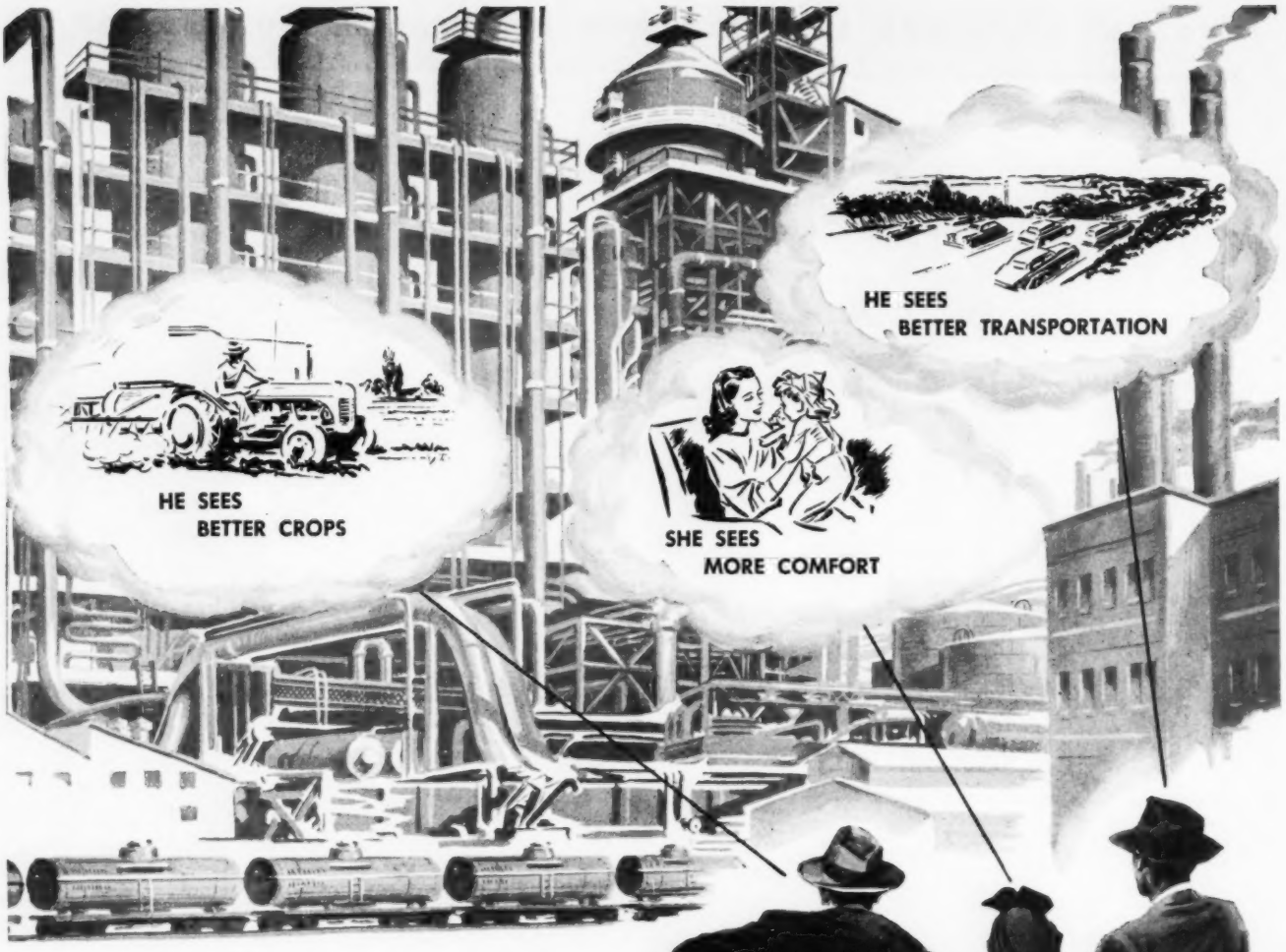

Three Views of a New Refinery

To the oilman a refinery is steel, pipe, brick, mortar, pumps and controls. It is his job to make these produce oil products that make for a better way of life at the lowest possible cost to the consumer.

If you are a farmer it means bigger and better crops with better weed killers; constantly improved fuels and lubricants for trucks and farm machinery. And it means healthier, more productive livestock with effective petroleum insecticides.

If you are a housewife it means the comfort and convenience of modern heating and cooking . . . the lasting protection of better paints and preservatives . . . more efficient operation of the family car with modern gasolines and motor oils . . . health protection with new and better insecticides.

If you are a businessman it means quick, efficient transportation of goods; faster and more convenient travel by petroleum-powered automobile, train, ship, or plane.

The oil industry has been built on providing a better way of life through more and better petroleum products. It will continue to play a big part in the rising productivity essential to human progress and world peace.

The better you live, the more oil you use . . .

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design patterns of all petroleum processes, —reproducible in any desired capacity.

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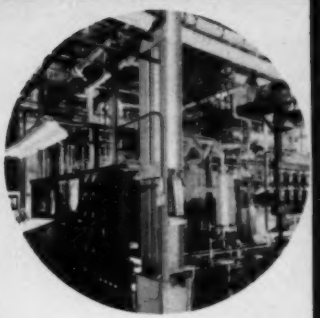
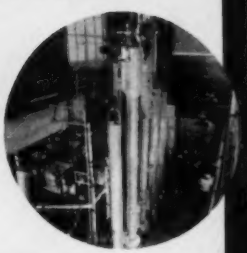
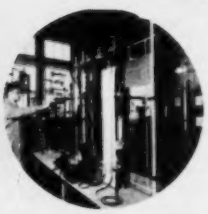


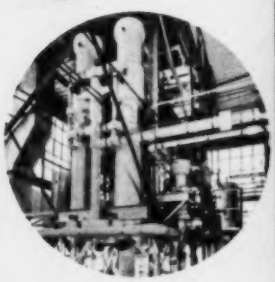
Vacuum Distillation



Precise Fractionation



Analytical Distillation



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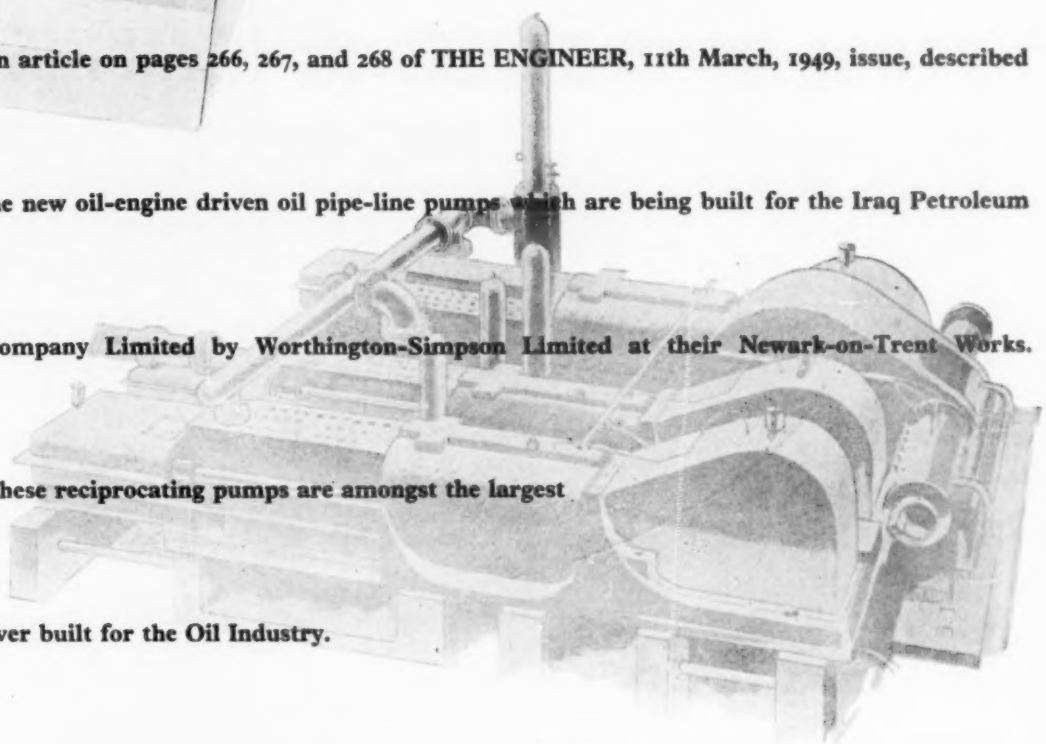
An article on pages 266, 267, and 268 of THE ENGINEER, 11th March, 1949, issue, described the new oil-engine driven oil pipe-line pumps which are being built for the Iraq Petroleum Company Limited by Worthington-Simpson Limited at their Newark-on-Trent Works.



These reciprocating pumps are amongst the largest ever built for the Oil Industry.

The performance of the pumps is described in this extract from the article.....

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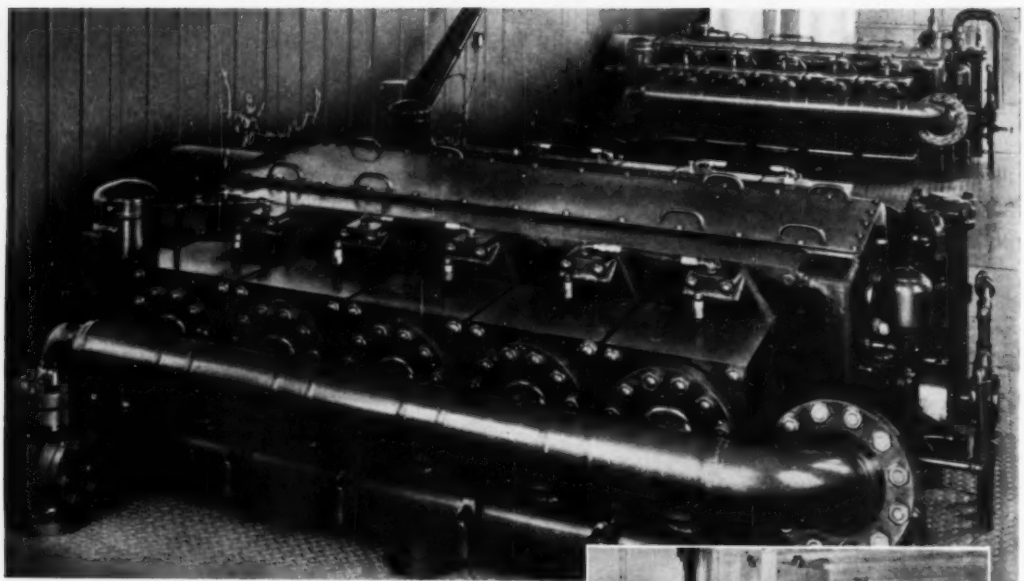

HERE, at a pumping station, in the Rocky Mountain area, revolutionary Cooper-Bessemer Twin-Line pumps have been in continuous use for the past 21 months. And here, in the field, they are *proving* the value of their cost-saving features.

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Twin-Line pumps are built in 2, 4, 6, 8, 10, and 12 cylinder sizes for capacities from 10,000 to 70,000 barrels a day at pressures up to 2000 psi. A new bulletin tells all about these pumps, explains the above advantages and many others equally important. Send for the bulletin today.

These two 500 hp Cooper-Bessemer gas-Diesel engines, fueled by gas and crude from the Rocky Mountain area, are direct-connected through a fire wall to the two 10-cylinder Cooper-Bessemer Twin-Line pumps shown in the large photo.

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WORLD PETROLEUM

Founded by Russell Palmer

PUBLISHED BY MONA PALMER

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

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SUBSCRIPTIONS

Annual subscription $5.00 (U. S.) postpaid
Single copies 50 cents

GENERAL OFFICES

2 West 45th Street, New York 19, N. Y.
(Tel. MUrray Hill 2-7333)

BRANCH OFFICES

LONDON: E. H. Doddrell, 342, St. Paul's Corner, Ludgate Hill, London E. C. 4 *(Tel. CITY 5318)*

LOS ANGELES 14: W. S. Johnson, Western Advertising Manager, 412 West 6th Street, *(Tel. Mutual 1391)*

NEW YORK 19: E. L. Townsend, Eastern Advertising Manager, 2 West 45th Street, *(Tel. MUrray Hill 2-7333)*

TULSA 3: O. F. Cozier, Mid-Continent Advertising Manager, 515 McBirney Bldg., *(Tel. 4-5555)*

World Petroleum is published by Mona Palmer, Trustee under the will of Russell Palmer

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This Month's Cover

Christmas greetings to the Newark, Ohio, community from atop the catalytic cracking unit in the Pure Oil Company's Heath refinery, a leading industry in the area. The Christmas wreath, which is about 30 feet in diameter, will be on display during the holiday season. When lighted with green and red bulbs, the greeting will be visible up to ten miles.

Greetings

from HALLIBURTON

EDITORIAL

OIL MAN'S VIEW OF THE FUTURE

ANALYSIS of discussion at the annual November convention of the American Petroleum Institute, both in the scheduled sessions and in conversations among the five thousand individual representatives in attendance, reveals a general agreement that the industry has reached another turning point in its long and varied development. During the wartime years thoughts and energies were concentrated on the tremendous task of providing the sinews of war that brought victory to the Allied cause. In the immediate postwar period a similar problem was presented in meeting the rapid rise in consumer demands.

In the year 1949, however, a different condition has been faced. As a result of pressing production to the limit in the endeavor to avoid a possible shortage at a time when the slackening of business activity, in combination with the mildest winter in a generation, drastically cut the consumption of liquid fuel, the industry found itself early in the year with a supply of certain products that overtaxed available storage and threatened a serious market disturbance. After being under pressure to attain greater and greater speed, it suddenly became necessary to go into reverse and slacken the pace. Such a change is not easy to bring about in an industry which is composed of thousands of separate units. There was much apprehension as to the effect of overflowing tanks upon the crude price structure and predictions of a disastrous decline in exploration and drilling that would impair the industry's ability to maintain adequate reserves. Gradually, however, through the revision of prices for products with stocks of unwieldy dimensions, with changes in refining ratios and the establishment of a closer balance between production and demand, the stress was measurably relieved with no serious market disturbance.

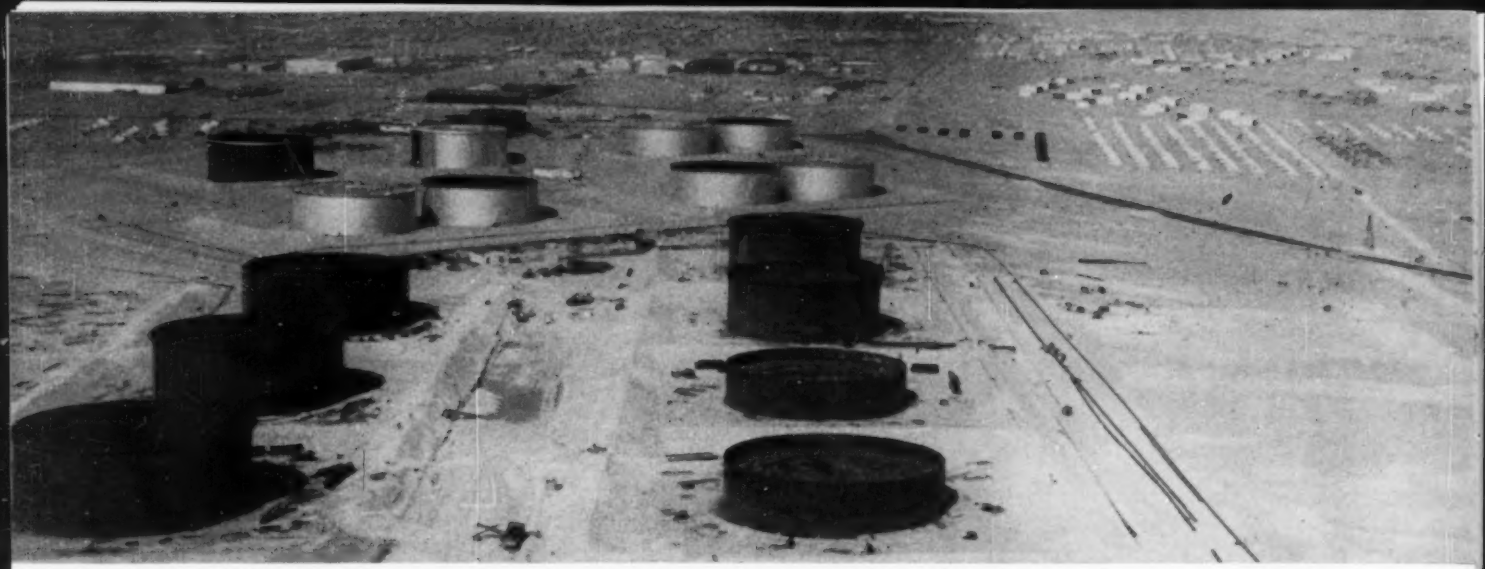
As the year progressed, while the incomes of most companies failed to equal the record of the preceding twelvemonth, none of the other disasters that had been predicted materialized. The extent of exploration and the number of wells drilled continued above the average of preceding postwar years; consumption of gasoline showed a healthy increase of nearly five percent over 1948, and exports of refined products were only slightly below those of the previous year. The demonstration of the industry's capacity for self regulation and its ability to adjust itself to changing conditions, whatever their nature, is as important in the way of assuring its future as earlier accomplishments in quickly expanding production to meet demand.

Out of their experience during the year now ending, the members of the oil industry have come to appreciate better than before the close relationship between the tempo of their activities and the general economic health of the nation and the interdependence of the two. With a fourfold multiplication in the use of petroleum during the past quarter century and a ninefold increase in the consumption of certain of its products, we have definitely entered upon an era of oil economy in which it is more necessary than ever before to adapt operations to fluctuations in industrial activities and seasonal changes in demand. No longer is it sufficient to concentrate upon the maximum output of a single product; effective utilization of every part of each barrel of crude is essential to profitable operation.

Looking ahead, the average oil man is highly optimistic concerning the future of his industry. He realizes that the extraordinary growth in consumption of petroleum during the past few years cannot be expected to continue at the same rate. Harking back to the years between the two world wars, he notes that there was a steady gain of approximately three percent in overall consumption and concludes that this is about what may be counted upon for the near future if no wars intervene. He knows that the use of petroleum products must increase because of their steadily growing importance as the base of all industrial progress and appreciates the necessity of maintaining and intensifying the search for oil in order to satisfy expanding domestic demands.

He is thoroughly confident of his ability to meet competition and so does not worry overmuch about the possibility of having his home market taken away by imports of foreign-produced petroleum. Likewise he is not particularly impressed by talk of world over-production or the argument that, in helping to build up an oil industry in other countries, we are creating competition that will damage us later on. His reasoning is that, if the industrial economy in other countries can be improved, that in itself will create new markets.

Oil men as a class appreciate that if their industry is to continue in a flourishing and profitable position, there must be constant study and invention to introduce new economies and greater efficiency. They recognize that the industry must be alert to oppose encroachment upon the freedom of initiative and action which has enabled it to reach its present high position of usefulness to the nation. They want their fellow citizens to understand the real nature and value of their industry and the services it performs. If these objectives can be attained, they have no fear of the future.



Tank farm at Ahmadi. Industrial area at left; residential area at right.

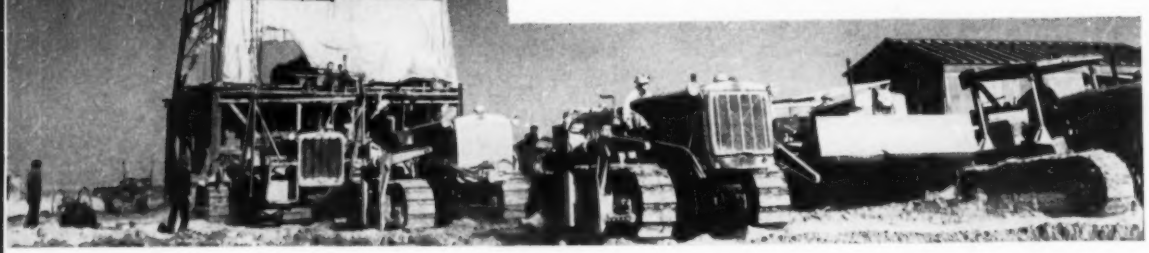
HUGE CONSTRUCTION PROGRAM REQUIRED FOR BURGAN FIELD DEVELOPMENT

THE Burgan field in Kuwait has been developed in the past 2½ years from a group of nine wells producing 45,000 barrels daily to one of the greatest oil fields in the history of the industry with a current production of 250,000 barrels daily and a reserve which has been estimated at ten billion barrels or more. The 62 completed wells at the end of the first half of this year have proved a producing area in excess of 25,000 acres.

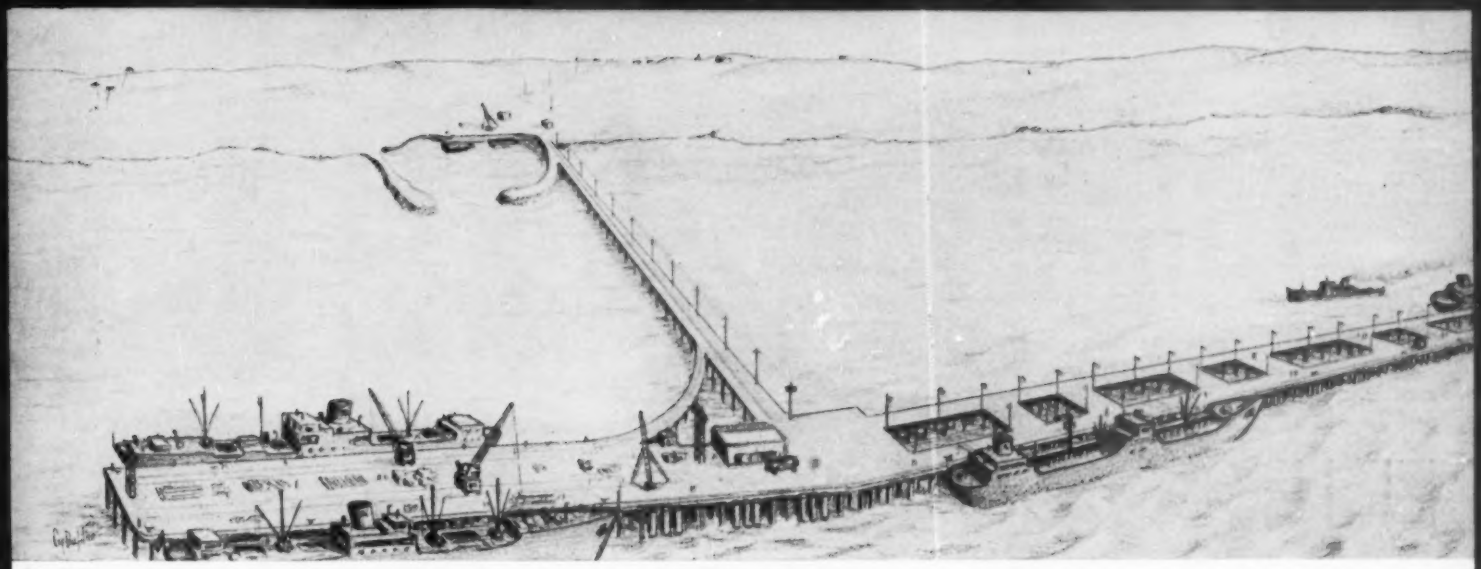
Behind this development lies a construction program of astonishing proportions even in an industry which is accustomed to big projects. Involved has been the construction of a harbor for tugs, the world's largest oil pier, a 25,000-barrel refinery, a 200-bed hospital, schools, laundry, bakery, electric power plant, refrigeration plant, air conditioning plant, and, in fact, a complete modern city in the Kuwait desert.

Although Kuwait Oil Co. Ltd. has held its concession since 1934 and the Burgan field was discovered in 1938, the present construction program was not undertaken until two years ago. War intervened to halt field development work and prevent Kuwait oil from reaching the world's markets until eight and a half years after the discovery well was drilled. Postwar drilling revealed the great potentialities of the field, and active planning for large-scale operations was undertaken in the middle of 1947.

The oil-loading jetty is now nearing completion



Skidding derrick across desert. Photographs with this article are reproduced through the courtesy of Kuwait Oil Co., Ltd., and Bechtel-Pomeroy Division of International Bechtel Ltd., engineers and constructors



Sketch of Pier with loading berths.

and is expected to be commissioned before the close of the year. The 25,000-barrel refinery went on stream about Nov. 1, 1949. The industrial area of the main camp is virtually completed.

The jetty is one of the most outstanding construction projects yet undertaken. It was made necessary by the lack of a natural harbor in the vicinity of the field and the uniformly gentle offshore slope of the subsurface in the Persian Gulf. Conditions are quite similar to those in Saudi Arabia which caused Arabian American Oil Co. to erect an unloading platform three miles out in the gulf with the spectacular "skyhook," overhead trolley system for unloading line pipe for the Tapline.

The accompanying drawing gives a general view of how the jetty will look when completed. It consists of an approach pier extending about 4,100 feet out into the gulf. This pier carries a roadway 24 feet wide and a pipeway 35 feet wide. The pipeway will carry eight 24-inch crude oil loading lines plus other servicing lines.

The "T" head of the jetty provides an oil pier 2,800 feet long and 105 feet wide for simultaneous berthing of six tankers and a cargo pier about 1,050 feet long and 105 feet wide for two cargo vessels.

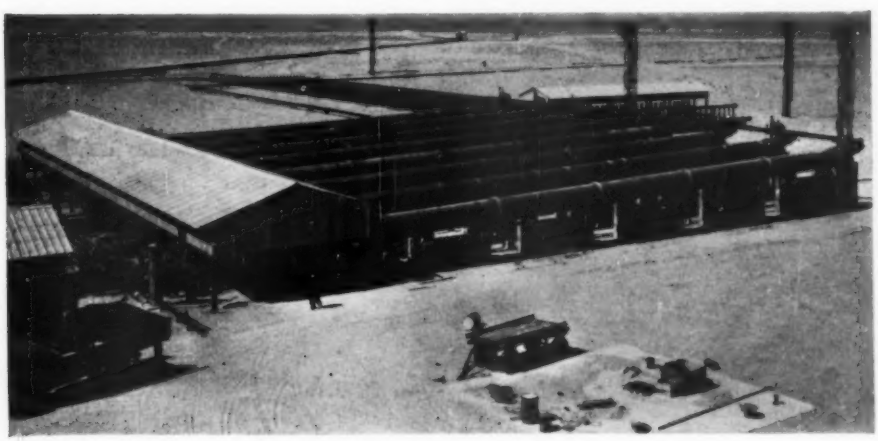
The pier is supported by 3,850 enamel-coated steel H beam piles. These are also cathodically protected against corrosion. As indicated in the drawing, the dry cargo section of the pier is to be equipped with an assortment of cranes.

The boat harbor shown at the base of the approach pier has involved the dredging of 210,000 cubic yards of sand and the building of two breakwaters totaling 2,800 feet in length. The harbor will accommodate tugs, barges and other craft required by the company's operations.

Incoming cargo requirements of the operation have been in excess of 16,000 tons monthly during the construction period but will continue at reduced level, because all supplies for the staff of several thousand employees and their families plus field and refinery equipment must be brought in from overseas. Completion of the jetty will facilitate this inward flow of materials and supplies as well as the outflow of crude oil. Thus far crude has been pumped through a series of ten 12-inch submarine lines to five offshore anchorage points. Each of these berths has been able to load out 10,000 barrels of oil per hour into waiting tankers. On completion of the new facilities, the tanker loading capacity will be increased to 600,000 barrels per day. Basic service installations were erected by the company when operations were resumed after the war, and much of the current building is of a permanent nature to replace temporary facilities. Examples of these include administrative and community buildings such as clubs, main offices and shops. The staff guest house for the accommodation of visitors is one permanent building, aside from individual homes, which has been completed. The company's 200-bed hospital is in operation with a large staff of British, American and Indian doctors and British nursing sisters. By the middle of 1950 much of the work on permanent buildings will have been completed.

Due to climatic conditions along the Persian Gulf it is necessary that staff and worker quarters as well as offices be well built. A monolithic type of building has been designed. Concrete mixed with sand instead of aggregate and containing a foaming agent is poured in metal forms for many of the buildings. The resulting

Exterior of separator gathering center.



Breakwater under construction at Mena al Ahmadi.

Refinery site with buildings under construction.

buildings minimize the effect of extreme changes in temperature and protect against blowing sand. Worker and staff houses have walled yards for greater privacy, comfort and wind protection.

The main power supply is at present from a number of diesel alternators whose output totals some 6,000 kilowatts. The main steam powerhouse now is progressing rapidly and is expected to be in partial operation in the autumn of 1950. This will consist of three turbine generators of 7,500 kilowatts each.

Because of the desert conditions prevailing in the area, water is a problem of growing proportions as the community and its facilities is enlarged. Annual rainfall in Kuwait averages perhaps 4½ inches, so surface drainage facilities are not an answer. The Arabs of the sheikdom depend largely on wells for water. These are handdug to a depth of 50-60 feet and yield a brackish water to which the Arabs have become accustomed but which is unacceptable for drinking by foreigners who are used to fresh, sweet water. Salinity of the brackish well water varies from about 2,500 ppm up to 112,000 ppm.

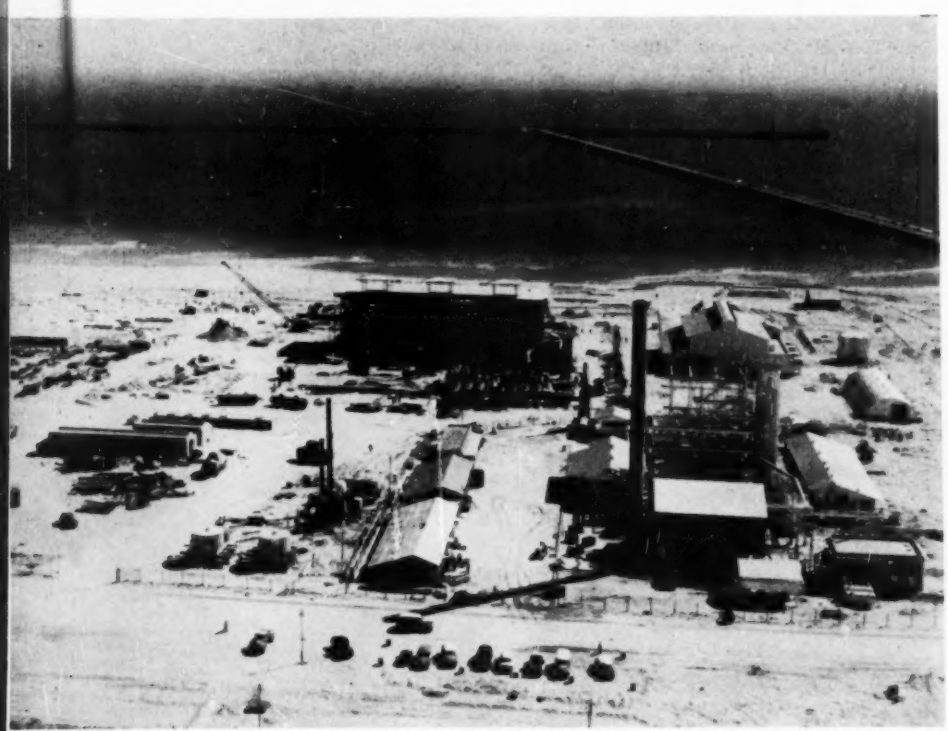
Kuwait Oil Co. uses fresh water brought by tanker from a source at the head of the Persian Gulf, brackish water from a group of company wells and sea water. Sea water is used as much as possible in all operations, and a low-pressure evaporating plant will be ready next year to produce 600,000 gallons per day of distilled water for drinking water. The six-unit plant is being erected near the central powerhouse which will supply process steam. The imported fresh water supply brought in by tanker is being supplemented now by a small evaporator at Mena al Ahmadi (Fahaheel).

Ample supplies of natural gas are available in the Burgan field for the power plant, refinery fuel and all other industrial and domestic purposes. Gas will be used to operate the three centralized air conditioning plants to supply both public buildings and homes with heat in winter and cold in summer. Cooling capacity of each unit is rated at 580 tons per day.

The Kuwait installations are grouped in an area at and near the coast some 20 miles south of Kuwait city, the population center of the sheikdom in which about half of the nation's 200,000 inhabitants live. At the coast itself are the shipping facilities, refining and power plants at Mena al Ahmadi.

Astride a ridge 6 miles inland from the Gulf is the company-built city for permanent employees and their families. Homes for these employees are being built on two sides of an area which will be devoted to shops, a marketplace for general trading, municipal offices, a dispensary, school buildings and playing fields. Industrial training is being promoted by the company now, and it is planned to expand this service by the erection of special buildings properly equipped for industrial arts. On the westward slope of the ridge adjacent to the housing and the general headquarters are being erected the air conditioning plant, bakeries, laundries, flour mills, workshops and other industrial facilities.

The company built city is named Ahmadi in honor of His Highness Sheik Sir Ahmad al Jabir al Subah, K.C.S.I., K.C.I.E., ruler of Kuwait, and the company constructed port, 5 miles east on the Persian Gulf is named Mena al Ahmadi, which means "Port of Ahmadi."



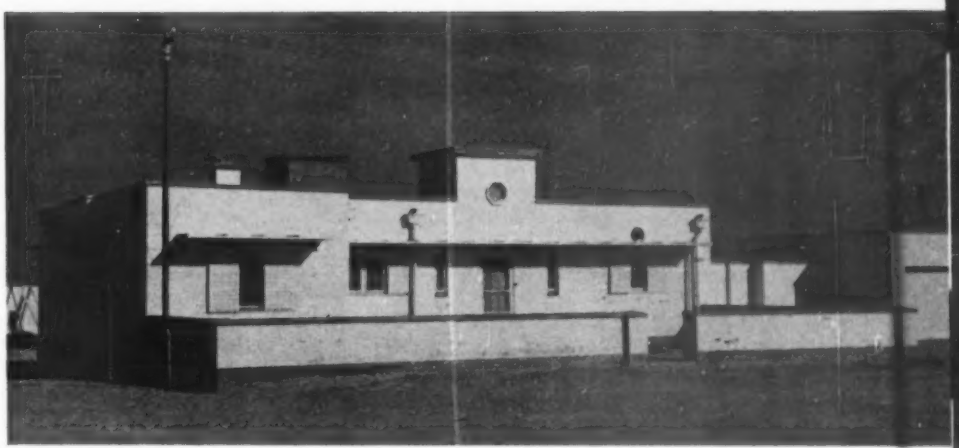
Portion of refinery with pier in background.
Photo by E. R. Finney

Football game at Ahmadi.

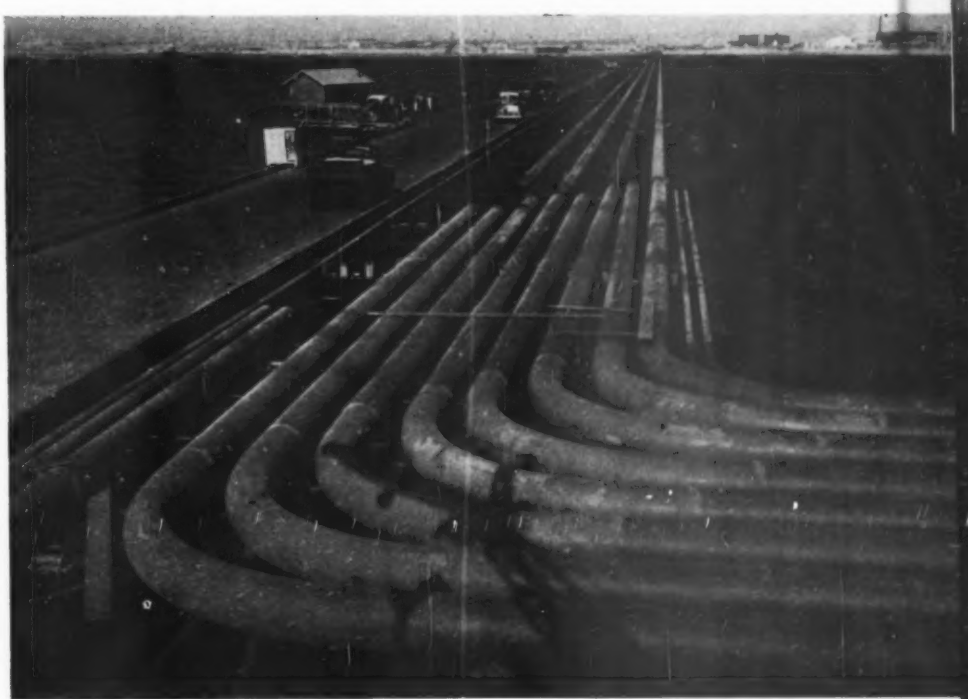
Although the Kuwait Oil Co. concession granted in 1934 covers the whole of the sheikdom, some 6,000 square miles, only one commercial field, Burgan, has been developed thus far. Following preliminary geological surveys, the first exploratory well was drilled to 7,950 feet in the Bahrah area north of Kuwait Bay where gas seepages had been observed. This was dry but encouraged the company to test the Burgan high, 28 miles south of the bay and 14 miles inland, where tar-impregnated sandstones outcrop in the hills which rise 250 to 300 feet above sea level. The first Burgan well penetrated the Middle Cretaceous sand at 3,672 feet in February 1938. In the next four years the company drilled eight additional wells as it sought to determine the potentialities of the discovery. In 1942 all nine wells were plugged as a result of the menacing drive of German armies toward the region . Six months after VE-Day field operations were resumed. Cement plugs were drilled out of the prewar wells, and by June 1946 the first commercial shipments of crude were made. In the last seven months of the year 5,928,792 barrels of oil were produced.

Drilling of new wells was undertaken as soon as the old wells were reconditioned, and an orderly development of the field has continued since that time. By the end of 1947 there were 13 wells producing and 24 more were completed in 1948, bringing the total to 37. Production rose from 62,000 to 212,000 barrels daily during the year. Two additional rigs were added in the early months of 1949, bringing the number of field operations to an average of 12. The 12 rigs completed 25 wells in the first half of this year, increasing the field total to 62.

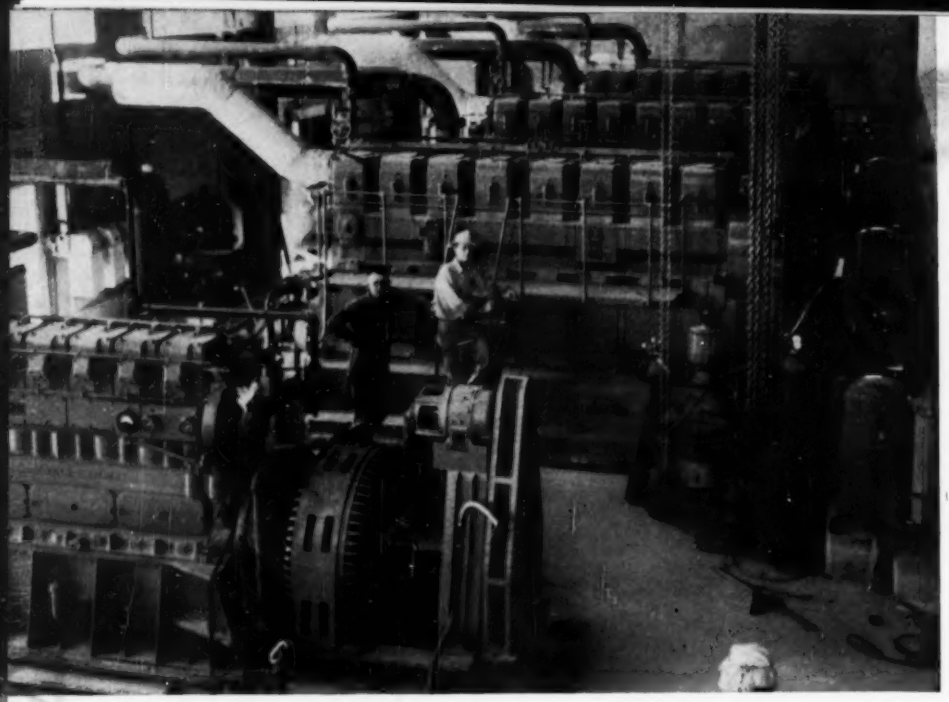
Unlike most oil fields in the Middle East, the principal producing formations in the Burgan field are sand and not limestone. The sands are of Middle Cretaceous age. There are three principal layers of sand below the shale caprock and one band of lime.



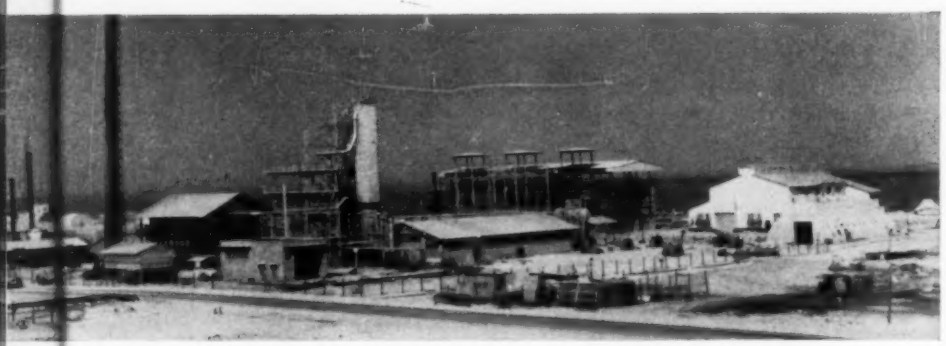
Type of housing for company employees.



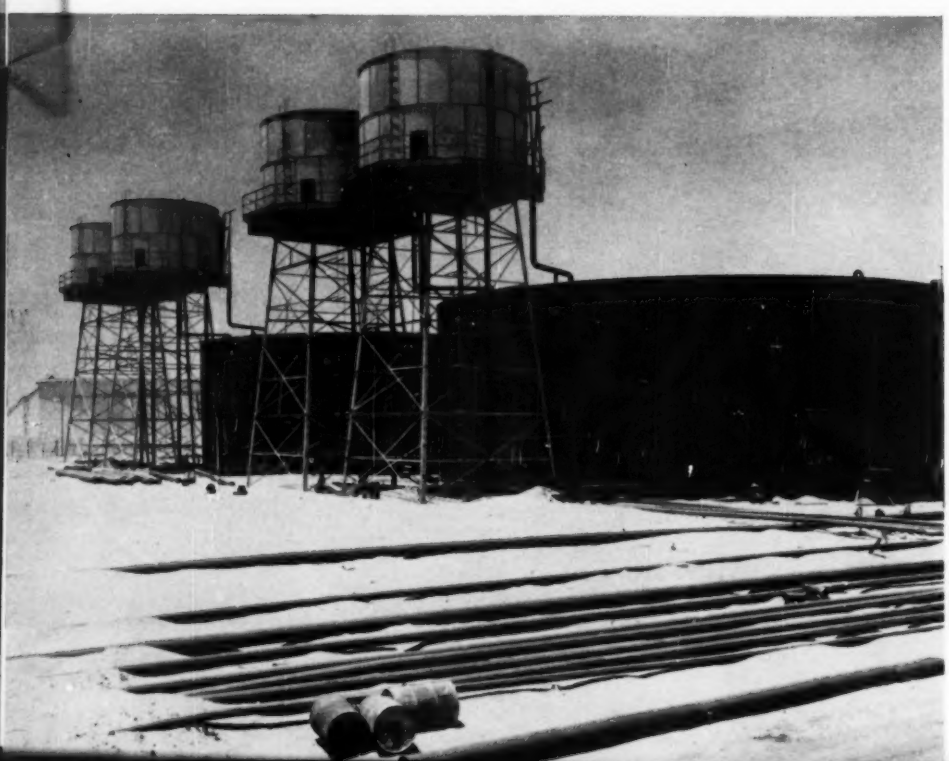
Pipes to loading Pier showing expansion bend platform.



Pump house at gathering center with Cooper Bessemer engines and General Electric generators.



Refinery under construction by E. B. Badger & Sons (Ltd.).



Ahmadi water tank farm.

The upper producing zone, topped at about 3,600 feet, is about 85 feet thick. Below this is the 25-foot Orbitolina lime. The middle sand varies in thickness from 200 to 300 feet and is considered to contain the greatest crude reserves, as upwards of 175 feet is a good producing zone. The lower sand zone is the thickest of the three but is underlain by the water table which limits the productive area. At the center of the field the sand above the water is about 500 feet thick, and four-fifths of this is productive. The various sands are separated by 100 to 150-foot shale intervals. At the center of the field the productive zones total around 1,000 feet in thickness. The shales and sands vary in thickness in different parts of the field.

Some of the wells have been completed to two zones, but the sands are separated by packers and produced separately so that accurate records can be kept to insure proper control of reservoir energy. Well rates have been kept down to a maximum of about 6,000 barrels daily. Original reservoir pressure was 2,075 psi and reservoir temperature 132°F.

Kuwait production rose month by month early this year to 280,000 barrels daily in April 1949, after which there was a reduction due to decreased market demand. September output was off 30,000 barrels daily or 11 percent. Average production in the first half of the year was 248,000 barrels daily compared with 127,200 barrels in 1948 and 44,600 barrels in 1947.

A considerable part of Gulf Exploration Company's share of Kuwait production is being purchased by Shell Petroleum Co. to satisfy its marketing needs east of Suez. An agreement to purchase increasing quantities of this crude was concluded between the two companies in June 1947. Small quantities of Kuwait oil have entered United States markets, the movement being begun a year ago when oil was temporarily short. Eventually it is planned to ship substantial quantities to Europe when the proposed pipeline is laid by Anglo-Iranian from the head of the Persian Gulf to the Mediterranean. In Europe Kuwait crude will compete for a market with Latin American as well as other Middle Eastern crudes. In Asia and Oceania the competition will be with Indonesian oil as well as with Saudi Arabian and Iranian fields.

Local oil demand in the Sheikdom will be supplied from the 25,000-barrel skimming plant now being completed. This nearby consumption is growing rapidly as the prosperity of the people improves. Oil is directly or indirectly responsible for this improvement in prosperity and in living standards here as well as in Saudi Arabia and Iran.

The very large reserves now proved suggest that the Sheikdom of Kuwait may well expect a long period of prosperity based on oil.

J. HOWARD PEW IS AWARDED API DISTINGUISHED ACHIEVEMENT MEDAL

J. Howard Pew

J. HOWARD PEW, director and retired president of Sun Oil Company, Philadelphia, and one of the founders of the American Petroleum Institute 30 years ago, was awarded the 1949 "Gold Medal for Distinguished Achievement" at the recent annual meeting of the American Petroleum Institute at Chicago. The Sun Oil Company executive was the fourth recipient of the API Gold Medal. The API established the award in 1946 to pay special tribute to prominent Americans who have made outstanding contributions to the public welfare through the petroleum industry. The medal has become one of the foremost industrial awards in the nation.

During World War I Mr. Pew was a member of the National Petroleum War Service Committee, which subsequently became the first board of directors of the American Petroleum Institute when it was incorporated on March 20, 1919. He served 29 years as an API director, retiring from office at the completion of his 1947 term, and was vice president of refining for the Institute from 1939 to 1946.

The sudden rush of events that followed the dramatic discovery of oil at Spindeltop, Texas, in 1901, tore J. Howard Pew from his studies at Massachusetts Institute of Technology and plunged him into a knotty research job at his father's Toledo, Ohio, refinery. The Spindletop discovery opened a new era in the oil industry, and J. N. Pew, Sr., founder of Sun Oil Co., hurried to the East Coast to pick a site for a new refinery to utilize the Texas crude that could be brought near the rich eastern market by water.

One hitch in plans had to be overcome quickly. The heavy, asphaltic Texas crude was different from the crude Sun had used at its Toledo refinery. New techniques were needed before the new refinery at Marcus Hook, Pa., could be started. Research yielded not only a formula for producing lubricating oil from Texas crude but also gave Howard Pew a formula to apply to all other undertakings: diligence and hard work. From Toledo, Howard Pew moved to Marcus Hook where he became assistant superintendent and then superintendent of the new refinery. During this period the oil industry mushroomed under the impetus of new oil discoveries in the southwest and the growing popularity of the automobile. Howard Pew saw his own company's "Red Stock" lubricants win acceptance not only in this country but in Europe as well, and saw scores of other companies form and flourish. He saw individual initiative rewarded.

Rooted in this period were the deep convictions about the American free enterprise system which Howard Pew was to enunciate with clarity and vigor in later years when he became an acknowledged spokesman for the oil industry. He became an implacable foe of those who sought to impose artificial restraints upon the economic activities and lives of men. He fought monopolies and cartels as forcefully as he opposed government interference. He rallied vigorous opposition to the NRA code, battling it on the grounds that it was a government-sponsored cartel. After the end of World War II he fought for an early termination of OPA controls, insisting that a free price structure was the very essence of a free competitive market.

Howard Pew pioneered the fight against excessive gasoline taxes, forming an organization in Pennsylvania which became a model for the Petroleum Industries Committee, a national organization now engaged in this work. He assumed leadership in a fight against a proposed Anglo-American petroleum agreement which its proponents almost stampeded into effect before its terms could be examined by those it would most seriously affect. He saw in the proposed agreement the threat of an international oil cartel. He had brushed with cartels in his own business in Europe, and he was aware of their restraints and backwardness.

He applied to his own business the same broad principles he advocated in his utterances on public affairs. Taking over as president of Sun upon the death of his father in 1912, he steered his company on a course which saw it developing its own processes and engineering know-how.

He had been Sun's chief executive only a few years when he, together with his brother, J. N. Pew, Jr., launched the building of a shipyard at Chester, Pa., a yard which served the nation's tanker needs in both world wars. He backed his brother, J. N. Pew, Jr., in the building of the petroleum industry's first product pipelines and firmly supported his nephew, Arthur E. Pew, Jr., in accomplishing the first large-scale commercial development of catalytic cracking to produce high octane motor fuel without the use of anti-knock additives.

Howard Pew's fiercely independent attitudes proved no handicap in the conduct of his business. In his 35 years as president, from 1912 to 1947, Sun Oil grew more than twentyfold, extending its operations into 25 states and Canada. Expansion was achieved largely from profits ploughed back into the business, a business concept established in the company by his father.

In addition to continuing as a member of the Sun board, he is turning increasing attention to cancer research, to serving as a member of the board of trustees of Jefferson Medical College and Hospital, Philadelphia, to Grove City College, Grove City, Pa., which he attended as a youth, and to his duties as president of the trustees of the General Assembly of the Presbyterian Church in the United States of America. He has been a member of the National Association of Manufacturers for many years and recently was elected an honorary vice president for life. As chairman of the public relations policy committee of the NAM, he guided that organization's opposition toward all forms of collectivism and bureaucracy.

GARVIN COUNTY GAS PLANTS

EMBODY NEW FEATURES

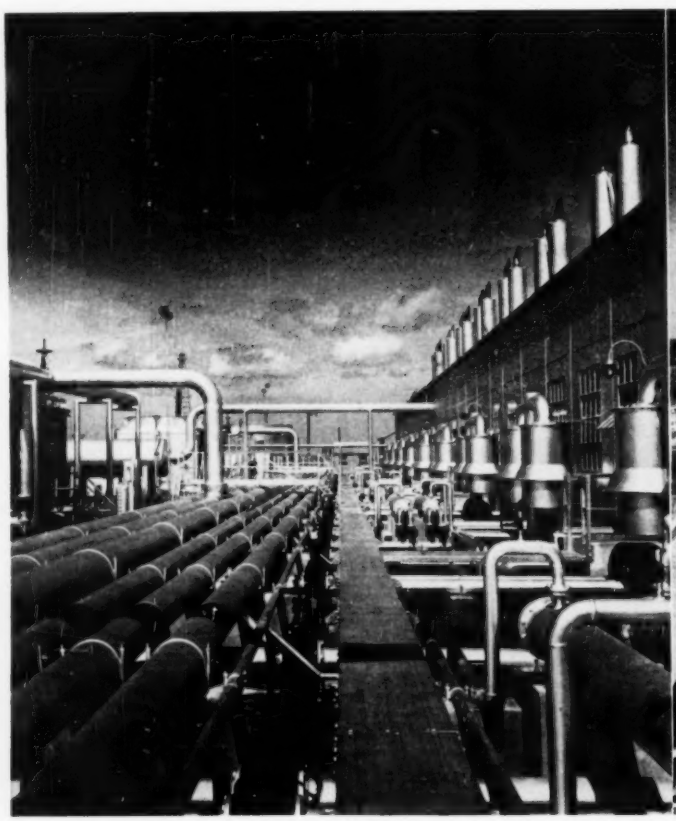
THROUGH cooperative action the natural gas from the principal fields of Garvin County in the Golden Trend area of Oklahoma is being treated in a group of connected plants which operate as a unit and are said to represent the largest installation of their kind in the world. At present the installation is treating 80 million cubic feet of gas daily, yielding 220,000 gallons of products. It is so designed and constructed, however, that it can readily be enlarged to handle double the current volume, an increase that is expected to be necessary as more gas becomes available from fields in the area.

Known officially as The Garvin County Plants, the project is a conservation undertaking by five companies with substantial holding interests in nearby fields. The proprietors are Carter Oil Company, Cities Service Oil Company, The Texas Company, J. E. Crosbie Inc. and Warren Petroleum Corporation. The last-named company was selected to direct the construction and operation of the project.

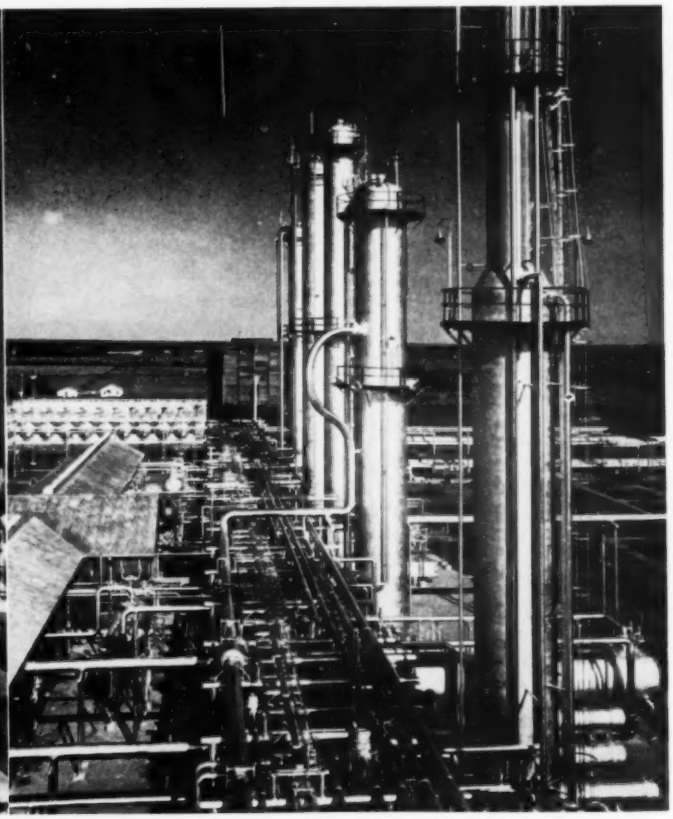
The ingenious idea of three separate plants so connected that they could operate as a unit was suggested by the fact that, while a number of oil pools have been discovered in and adjoining Garvin County, these were not large enough individually to justify the erection of natural gas processing plants. As a group, however, they provide a supply sufficient to feed a central plant of the most modern and efficient type in which the main processing operations are conducted with feeder stations in which the raw material passes through preliminary phases of treatment. This is the plan that has been followed. The large central plant is located at Maysville, while the two compression and absorption units are situated, one at Lindsay, about seven and a half miles to the west, and the other at Antioch, an equal distance to the southeast. As a unit they process gas from the Antioch, Elmore, Lindsay, New Hope and Wayne pools. Since there is continuous circulation in both directions between the central plant and its two outposts, it will be realized that a large network of pipelines is required. Approximately 200 miles of underground lines, ranging from two to 30 inches in diameter, constitute this system which includes gas gathering, gas injection, residue gas, oil, water, gasoline and liquefied petroleum gas loading lines.

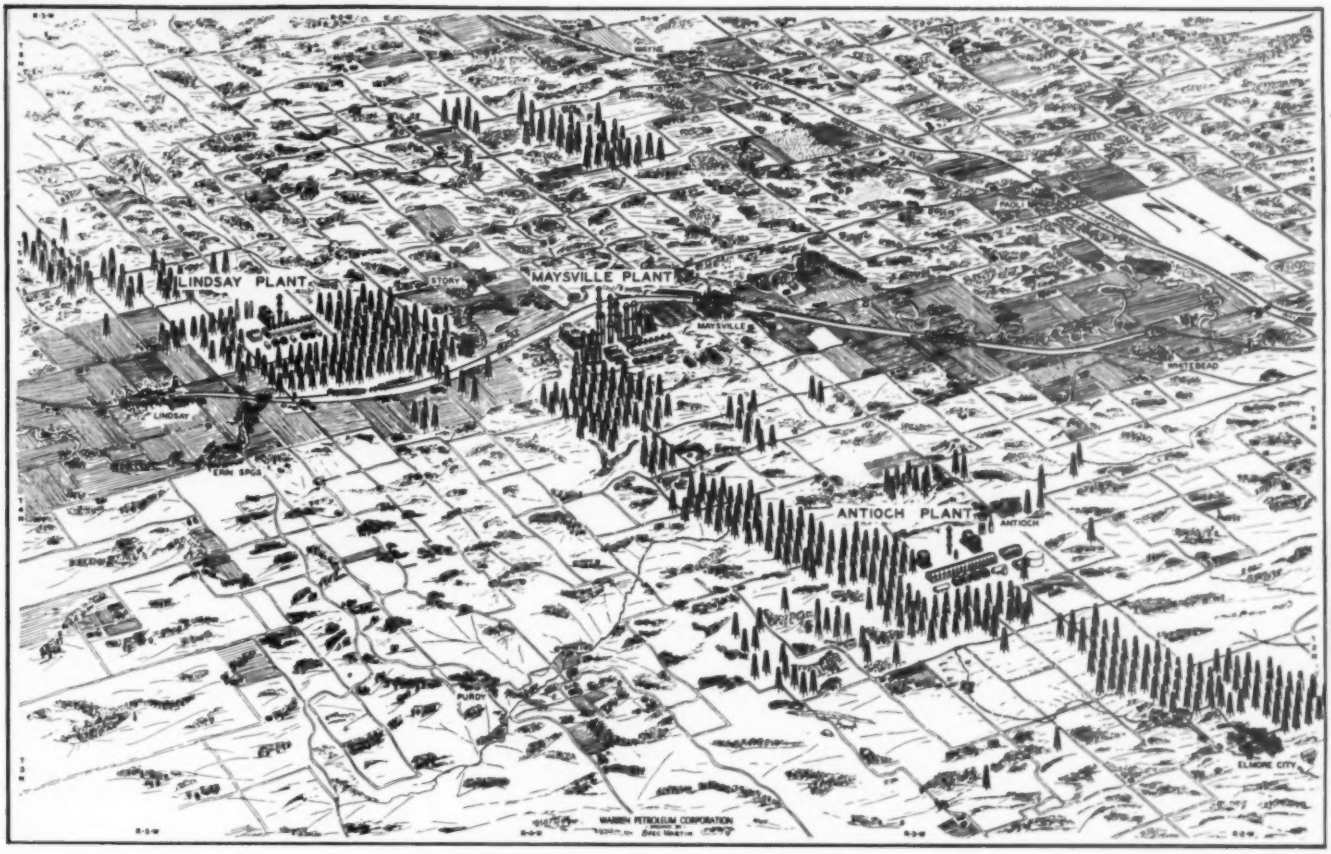
Other salient features of equipment include a total of 21,200 compressor horsepower installed to handle in excess of 80 million cubic feet of gas per day from approximate atmospheric pressure to 760 pounds absorber pressure, and an additional average of 25 million cubic feet of residue gas per day for reservoir injection at pressures up to 2,400 pounds. Approximately 8,655 gas engine horsepower is employed to drive such units as electric generators, lean oil pumps, water

Gas headers feed to compressors in the building at the right in the compression and absorption unit near Lindsay.



A portion of the distillation and fractionation equipment at the Maysville unit.





Map shows location of plants and some of the fields supplying them.

system pumps and plant vapor compressors. Some 400,000 gallons of water are consumed daily, despite the fact that none is used for steam generation and air cooling has been employed to the fullest extent.

One of the first problems encountered in the preliminary planning of The Garvin County Plants was the scarcity of water in sufficient and dependable quantity in that vicinity to supply a major industrial plant operation. After repeated surveys a location was selected approximately 17 miles south of the Maysville unit, and four wells within a one-mile radius were drilled to a depth of 500 feet. These wells supply approximately 10,000 barrels daily for utilization by the three plants. The water supply problem and its cost was responsible, to some extent at least, for the incorporation of several somewhat unique features in the project.

For example, direct fired vertical tube coil oil heaters are used to provide heat for the two distillation stills, all fractionator reboiler heating and all other plant requirements in order to eliminate steam boilers generally used in gas processing plants. Two furnace units, having heating capacity of 33,950,000 Btu per hour each, are capable of heating rich oil to the stills from 380 to 525° F. Two similar units rated at 41,500,000 Btu per hour each supply primary heat to a continuously circulated heating oil stream which supplies all plant heat requirements above the conventional exchange recovery from the still base hot lean oil. Engine jacket water cooling is handled by radiator type coolers, as are also the still and debutanizer primary condensers, which insures a minimum cooling water loss.

Another feature is the installation of two parallel units, for rich oil demethanizing and distillation, in order to avoid excessive tower diameters and fabricating costs and to provide added operating flexibility.

Although Maysville is the central plant, the first unit to be constructed was that at Antioch which was started in December 1947 due to the fact that operators in that vicinity were anxious to begin repressuring operations as soon as possible.

The Antioch unit consists of a battery of 13 gas-engine-driven angle type compressors having a total installed horsepower of 8,400. These units compress field separator gas from five inches vacuum through three stages to 760 pounds absorber pressure. The design volume is 31 million cubic feet of gas daily.

The Antioch absorber, five feet in diameter and containing 30 trays, was designed for 800 pounds maximum working pressure and 40 million cubic feet gas capacity daily. The residue from the absorber is dehydrated in solid desiccant type dehydration units designed for a daily capacity of 30 million cubic feet of gas. Gas for reservoir injection is compressed to 2,400 pounds by three vertical gas engines totaling 2,000 horsepower.

Since the Antioch unit, completed in July 1948, went into operation before the remainder of the project was completed, two used fractionating columns were installed for temporary service, and the plant produced approximately 30,000 gallons daily of compression gasoline between July 1948 and July 1949. After completion of the Maysville distillation unit, the temporary equipment at Antioch was removed.

The Lindsay unit, placed in operation in March 1949, contains 10 vertical gas engines of 800 horsepower each, driving angle-type compressors to compress gas from five inches vacuum to 760 pounds. Nine of the compressor units are designed to handle 27 million cubic feet of gas daily through three compression stages. The tenth compressor handles up to 9,000,000 cubic feet of gas daily through one stage, since separator gas from one portion of the Lindsay field has in excess of 200 pounds pressure available at the separators.

The absorber, also five feet in diameter and containing 30 trays, is designed for a maximum working pressure of 800 pounds and operates at 760 pounds. It will handle a gas volume up to 40 million cubic feet daily. The residue from the absorber is dehydrated in solid desiccant type units and is sold to a gas utility company. The

gas dehydrator units are regenerated with residue gas pre-heated in a direct-fired vertical tube coil furnace having a rated capacity of 3,050,000 Btu per hour.

Between March 1949 and completion of the Maysville plant, the Lindsay unit delivered raw gasoline or compression product through pipelines now used for absorption oil to the temporary stabilizing units at Antioch for fractionation into butane and natural gasoline.

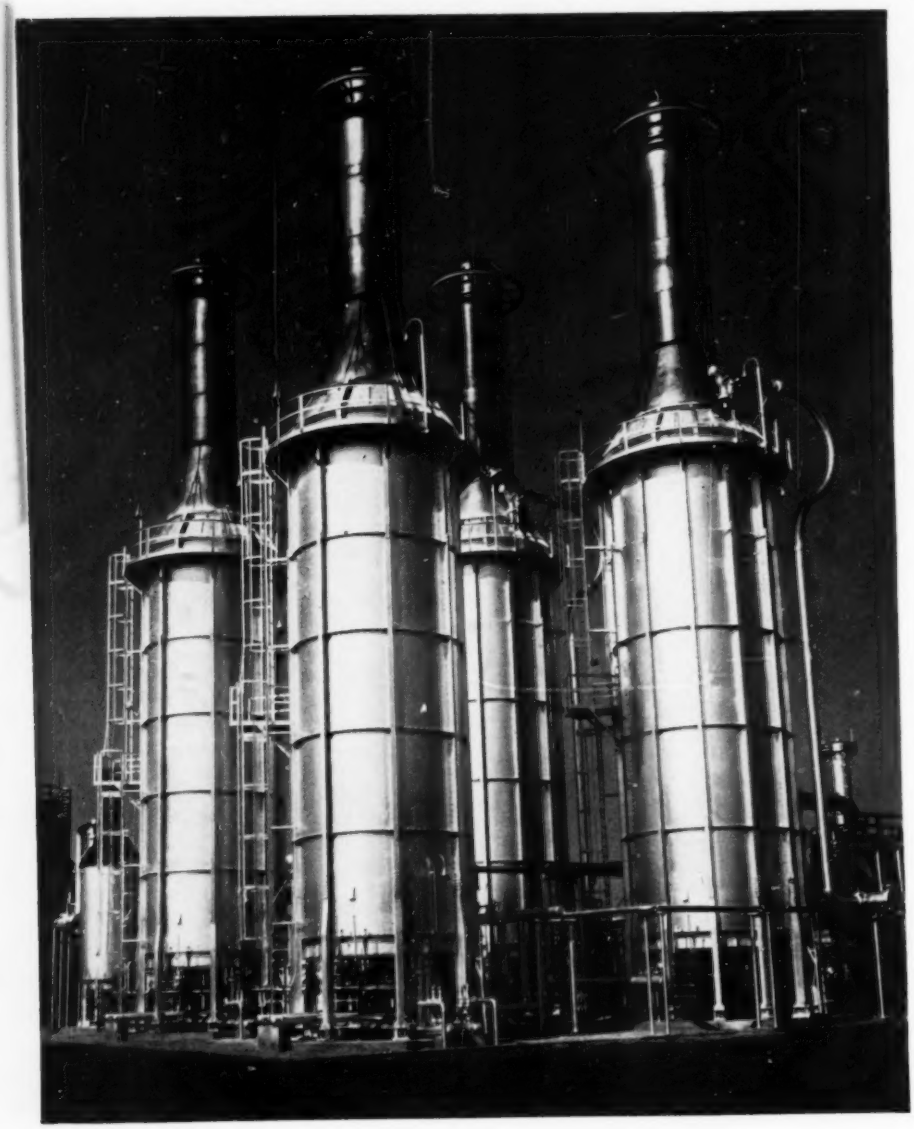
The Maysville plant consists of compressor and absorber cycles similar to the Antioch and Lindsay units, as well as complete distillation, fractionation, storage and loading facilities for natural gasoline and liquefied petroleum gas products recovered in the three absorbers.

Two 600-horsepower vertical gas-engine-driven, angle type compressors handle approximately 4,500,000 cubic feet of gas daily from five inches vacuum through three stages to 760 pounds absorber pressure. Two 800-horsepower units compress approximately nine million cubic feet of gas daily or separator gas available at 40 pounds pressure through two stages to absorber pressure. The absorber, four feet and six inches in diameter and containing 30 trays, is designed to handle 30 million cubic feet of gas daily at 760 pounds pressure.

The rich oil streams from the Antioch, Lindsay and Maysville absorbers are commingled and flashed in two 7 x 30-feet surge tanks operated at 285 pounds pressure. The rich oil from the surge tank is fed to the top of the stripping sections of the two parallel operated oil demethanizers at 250 pounds pressure and 80 to 90° F.

The rich oil demethanizers are so constructed that the stripping section is seven feet in diameter and contains 20 trays, while the upper or absorbing section is 4½ feet in diameter and contains 30 trays. Stripping heat for the rich oil demethanizer units is supplied by exchanging hot lean oil from the still with a base draw-off stream of rich oil from the stripping section, which is returned to the base of the demethanizer towers. Additional base heat is provided by a final shell and tube unit heated by hot oil from a direct-fired heating oil furnace.

Direct-fired oil heaters are rated at 30 million Btu per hour.



The level controlled rich oil stream from the base of the rich oil demethanizers flows direct to the parallel operated hot flash tanks. The temperature of the rich oil from the hot flash tanks is raised from 380 to 525° F in the rich oil direct-fired vertical tube coil furnaces and fed to parallel operated stills at 90 pounds pressure. The stills are eight feet in diameter and contain 30 trays each. The vent hydrocarbon vapors from the hot flash tanks are preheated by hot lean oil from the still base and fed to the stills as primary stripping medium several trays below the rich oil feed. Final stripping of the oil in the still is accomplished by pre-heating deethanizer overheat vapors to 500° F and feeding to the stills below tray No. 1.

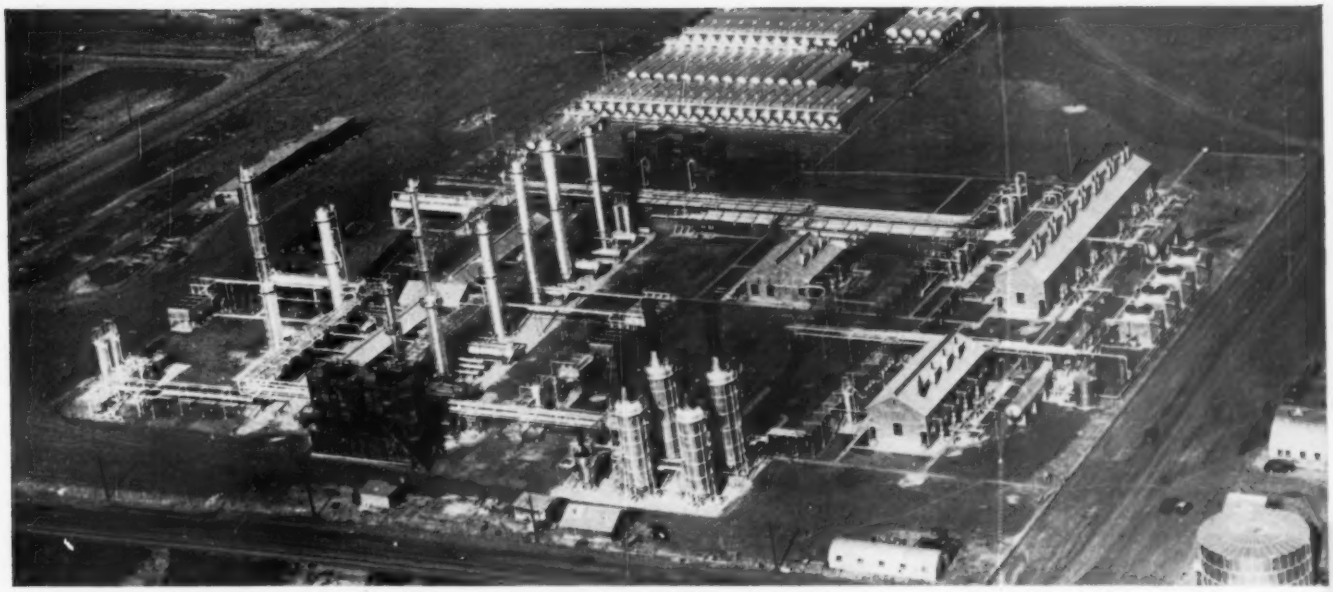
Air-cooled type finned coolers are employed for primary condensing of still overhead vapors. Final condensers are atmospheric type water flooded coils in an induced draft cooling tower.

Vent vapors from the raw gasoline make-tank operated at 75 pounds pressure are compressed and coil blended with the liquid hydrocarbon stream from this tank and then delivered to two large parallel operated gasoline surge tanks. The total raw gasoline production is dehydrated in solid desiccant type units which permit refrigeration of the deethanizer overhead stream with the result that the commercial propane product from the depropanizer overhead does not require further dehydration.

Final fractionation is carried out in the conventional cascade cycle. The deethanizer vent vapors are used for final oil stripping in the stills, and the base product is fed to the depropanizer which produces commercial propane overhead and butanes and heavier from the base, which is fed to the debutanizer.

The debutanizer operating conditions are determined by the vapor pressure natural gasoline required. One unique feature of the debutanizer operation is that reflux is totally condensed in an air-cooled fin-type coil. The net butane product to storage is finally cooled by water over atmospheric coils located in the induced draft cooling tower. Reboiler heat for all fractionators is supplied by the hot oil stream circulated continuously through heating oil furnaces. Natural gasoline from the base of the debutanizer is cooled in atmospheric coils and treated to provide non-corrosive gasoline as a final product.

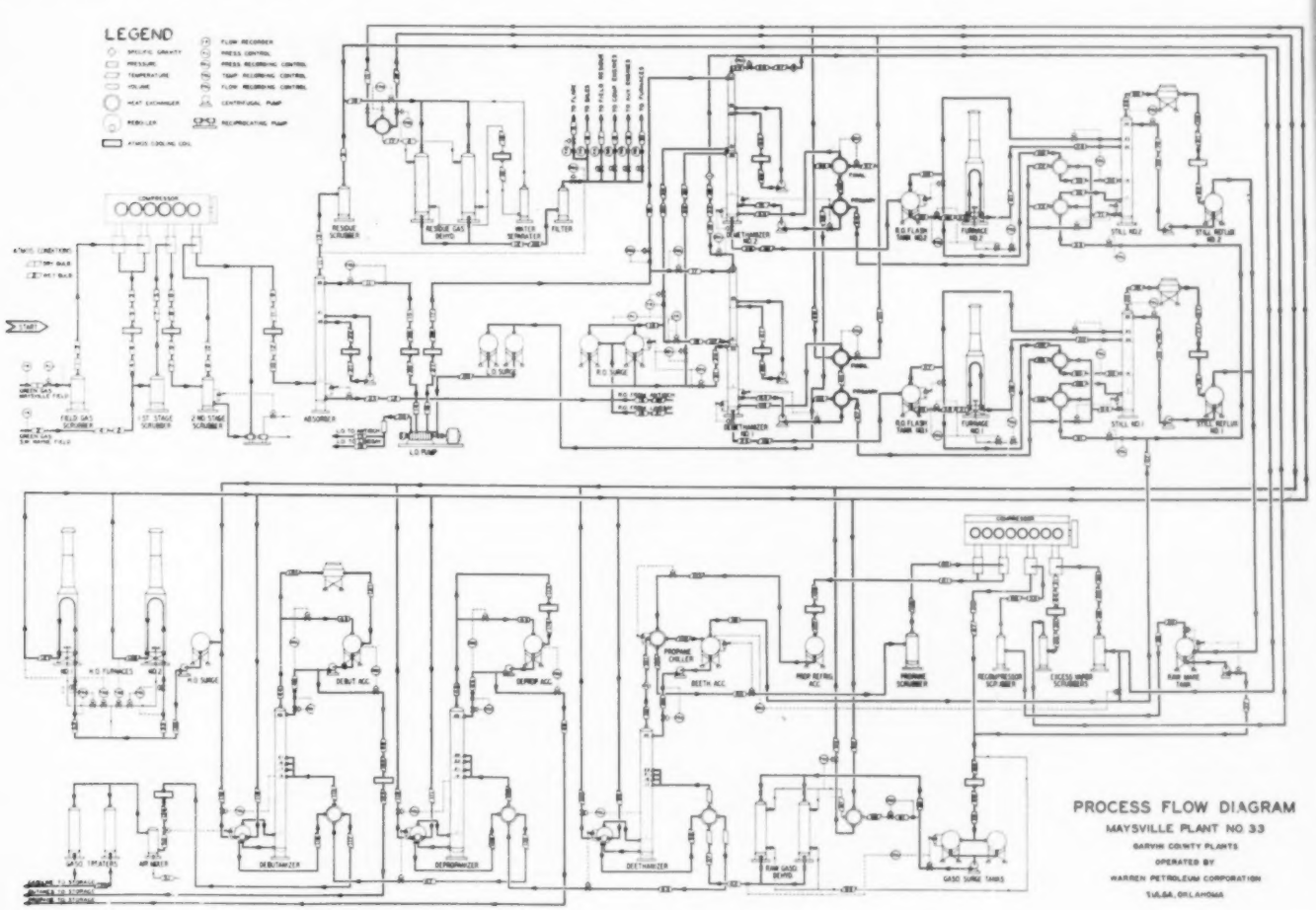
Pressure storage tanks having a total capacity of 1,900,000 gallons serve as plant storage of various vapor pressure natural gasolines, butane and propane. Electrically-driven centrifugal pumps can deliver the three products simultaneously to



Aerial view of the Maysville unit, cooling towers and oil furnaces in foreground, distillation and fractionation equipment at the left; and storage for natural gasoline and LPG in background.

a 38-unit tank car loading rack located approximately two miles from the Maysville unit. Tank truck loading facilities are provided adjacent to the storage tanks. Electrically driven plunger type pipeline pumps deliver natural gasoline to two pipelines at specified periods.

The plants were constructed from company designs by the Dresser Engineering Company of Tulsa and embody the latest in approved processing and equipment. As now constituted, the plant can exceed 300,000 gallons of liquid products when operating at maximum. As previously stated, it is designed for future enlargement as may be necessary.

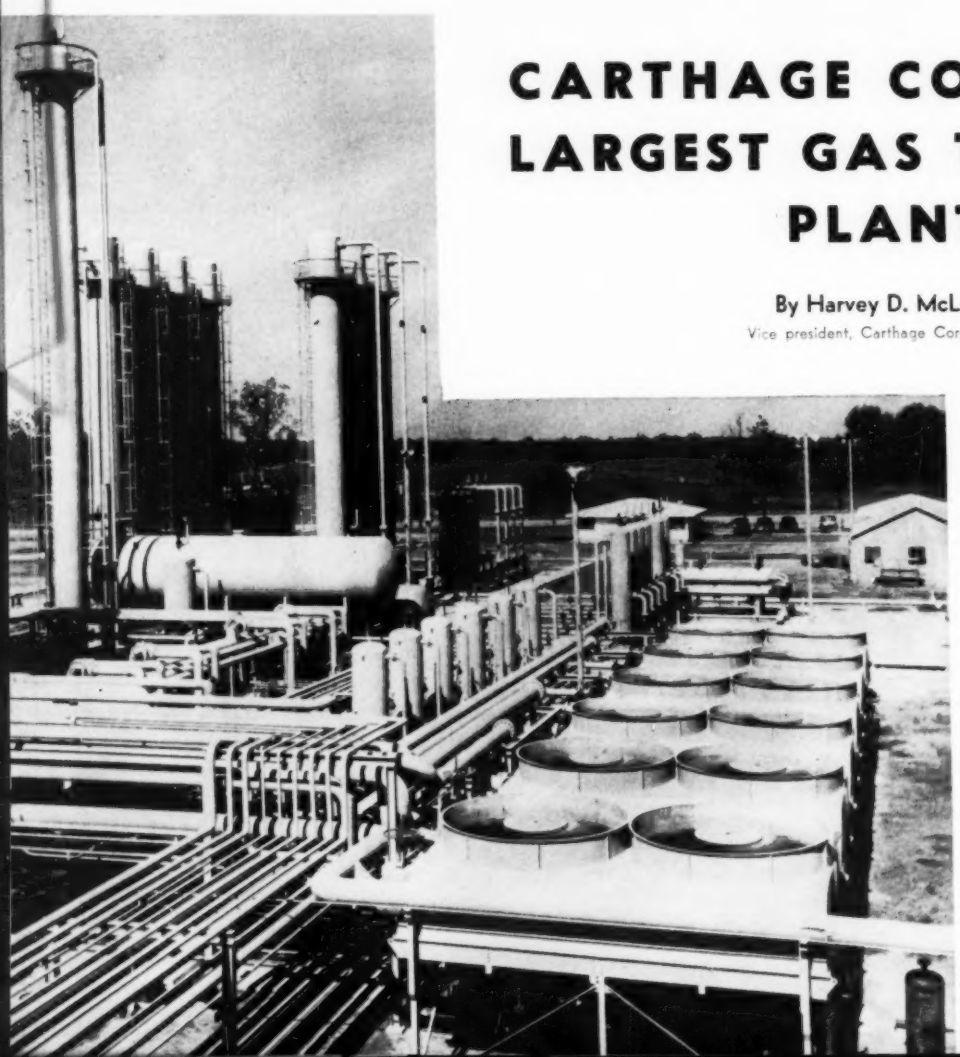


Aerial view showing complete plant except for loading rack and loading rack tankage. In foreground are office building and laboratory, at left cooling tower and air-cooled exchangers. In center foreground absorbers and "Dessiflo" dehydrators. At left background is the gas-fired equipment including steam boilers, Dowtherm boilers and oil heaters.

CARTHAGE COMPLETES LARGEST GAS TREATING PLANT

By Harvey D. McLean

Vice president, Carthage Corporation.



THE Carthage Corp. plant recently completed in the Carthage field of Panola County, east Texas, is the largest gas processing plant so far built for delivery of dry natural gas for pipeline transportation. It is connected to 167 wells, draining 73,800 acres of gas-producing leases owned by 52 different companies or individuals. The most remote well is 11½ miles from the plant, while the nearest well is on a lease contiguous to the plant site. Gas is produced from four different horizons from 4,900 to 6,100 feet deep.

Pipelines gather the gas from the wells and bring it to the plant inlet scrubbers, where hydrocarbon

View of Hudson air-cooled heat exchangers at right with absorbers and "Dessiflo" contactors at left. Inlet gas-condensate separators are shown in two rows at center of picture.

liquids produced by retrograde condensation are separated from the gas. Gas from the inlet scrubbers flows through absorbers where a large percentage of the propane and practically all heavier hydrocarbons are absorbed. From the absorbers the gas flows through dehydrators, where water vapor is removed, and thence into the gas transmission pipelines. The operating pressure of the inlet scrubbers, absorbers, dehydrators and interconnected piping is determined by the pressure required by the pipelines and ranges from 850 to 1250 psi.

Seven high-pressure absorbers, 66-inch inside diameter and 72 feet high, are installed. Absorption oil is pumped over these columns by a six-stage centrifugal pump, with a portion of the oil required for the 850-pound absorption system being withdrawn from the fourth stage. The flow of oil to each absorber is controlled by instruments in the lines serving the individual columns. Rich oil, containing hydrocarbons removed from the gas, flows from the absorbers through two flash tanks, in series, where pressure is reduced and a portion of the absorbed hydrocarbons released as vapor. The vapors are recompressed and returned to the absorbers. From the flash tanks rich oil flows to a surge tank, with a further reduction of pressure and release of vapors. Vapors from the rich oil surge tank flow into a reabsorber. Heavier hydrocarbons are removed from these vapors with absorption oil, the rich oil flowing by gravity into the rich oil surge tank effluent.

One of the new and unusual features in the Carthage Corp. plant is the use of liquid, rather than solid, desiccant for dehydration to obtain very low water vapor content of gas entering the cross country pipelines. The water vapor content of the gas must be below seven pounds per million cubic feet to meet gas sales contracts. A liquid desiccant plant was designed to dehydrate 110° F gas to meet this low dew point requirement. The liquid circulating dehydration plant in operation at Carthage Corp. has exceeded design expectations, reducing the water content to less than four pounds per million cubic feet, representing dew point depression previously considered as an impossibility with liquid dehydrating mediums. The dehydration process used at Carthage Corp. is termed the "Dessiflo" process. For certain specific applications it has advantages over the solid desiccant processes usually employed for obtaining low dew points, being a continuous process with lower first cost and operating costs.

Liquid hydrocarbons are removed from the gas in the inlet scrubbers and flow, in series, through three flash tanks operating at descending pressures. Vapors from the first and second flash tanks are combined with vapors from the rich oil flash tanks and are recompressed and returned to the absorbers. Vapors from the third flash tank flow into the reabsorber, and the distillate liquid from this vessel flows into the distillate propanizer-deethanizer. This distillate, which is a mixture of comparatively heavy liquid hydrocarbons, is a good absorbent for lighter hydrocarbon vapors. The temperature of the distillate is relatively low, adding to its value as an absorbent. These characteristics are used to advantage in the distillate propanizer-deethanizer, where the distillate serves as an absorption medium, flowing through the column counter-current to uncondensed vapors from the still. The contact of the distillate and the still vapors results in the absorption of heavier hydrocarbons from the still vapors and in the stripping of lighter constituents from the distillate; thus are accomplished two highly desirable results in one column.

The resultant distillate is combined, in the lower part of the distillate propanizer-deethanizer, with condensed hydrocarbons from the still overhead and the entire liquid stream stripped with vapors generated in a reboiler connected to the column. The liquids leaving the reboiler comprise the entire plant production of liquid products. The vapors leaving the top of the column are less in volume than the uncondensed still overhead vapors, yet the liquid leaving the reboiler is stripped of methane and ethane to final product specifications. The heat added in the reboiler is from low-pressure exhaust steam and is conserved by contributing toward the necessary preheating of feed to the debutanizer.

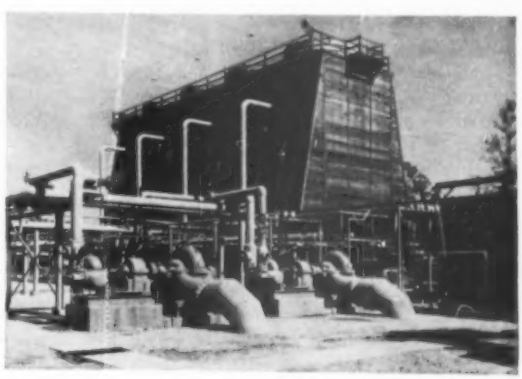
Vapors from the distillate propanizer-deethanizer flow into the rich oil surge tank, where close approach to equilibrium is obtained between the rich oil in the tank and the vapors. This near equilibrium accomplishes the dual purpose of absorbing heavier hydrocarbons from the vapor and stripping lighter hydrocarbons from the rich oil. The volume of uncondensed vapors leaving the surge tank is approximately one-half the volume of vapors entering it, yet the methane in the rich oil leaving the tank is considerably less than in the rich oil entering the tank. The rich oil effluent is pumped through exchangers into a separator, where vapors released from the heated oil flow directly to the still. Liquid from the separator flows through direct-fired rich oil heaters into the still, where absorbed hydrocarbons are removed from the oil by steam distillation. To conserve heat and to reduce the load on the still and the condensers, cold rich oil is used as a reflux medium for the still. Because the volume of liquid handled in the stripping section of the still far exceeded the generally accepted safe liquid loading for trays in a column designed conservatively for the vapor load, a unique design employing raschig rings was used instead of increasing the diameter of the column sufficiently to accommodate the liquid with trays of standard design. This packed section, of a diameter selected for vapor load, has operated with a stripping efficiency equal to that of a column of equal height but larger diameter equipped with standard bubble trays.

The total raw product is pumped from the raw product feed tank into the debutanizer, where butanes and propane are removed overhead. These products are then pumped into the depropanizer, where finished propane is produced overhead, and a mixture of butanes flows from the reboiler. The debutanizer bottoms flow into the gasoline fractionator. Motor fuel of controlled end point and vapor pressure is removed overhead from this column. Products heavier than motor fuel flow from the reboiler into the naphtha fractionator. Naphtha of controlled end point is removed from this column, with heavier products flowing from the reboiler into the kerosene fractionator. Kerosene of controlled end point is the overhead product of this column, with heavier products flowing to a final fractionator for separation into mineral seal oil and residuum. Each of the four heavy product fractionators is equipped with sidestream draw-off connections to provide for possible future production of different fractions.

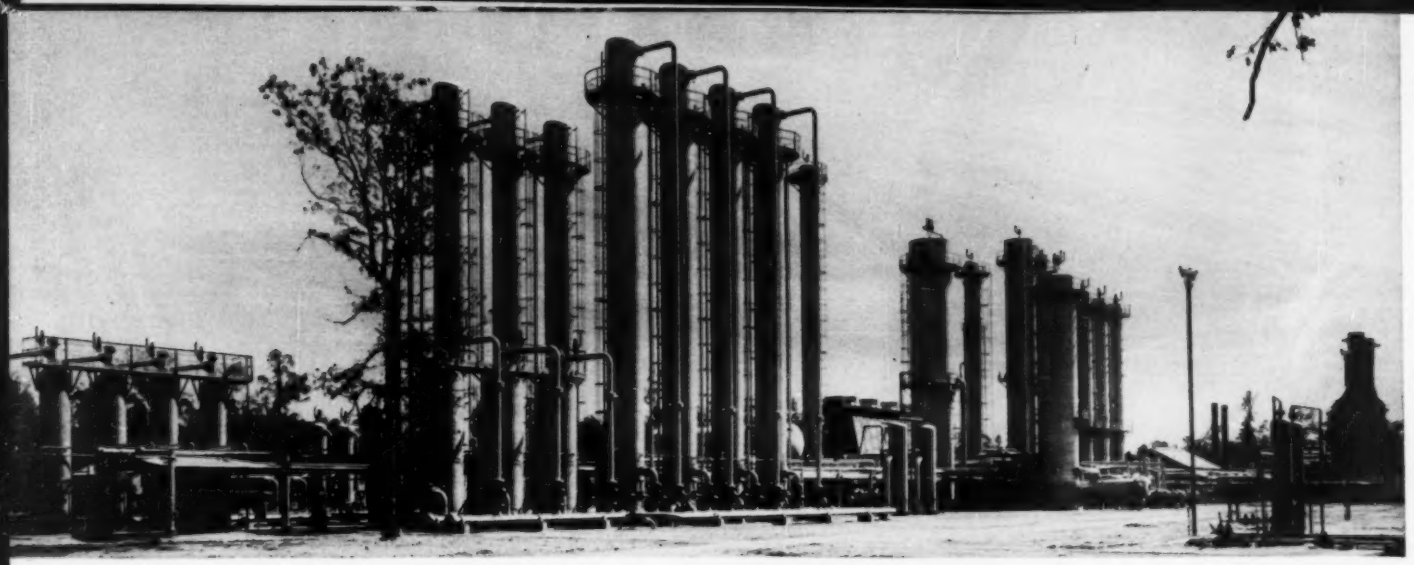
Heat for process control in these fractionators is obtained from Dowtherm vaporizers. Vapor Dowtherm "A" is condensed in the reboilers, and the condensate returned to the vaporizer in a closed cycle. Heat input is controlled by appropriate instruments.

The use of Dowtherm as a high-temperature heating medium for process control, while not new, is unusual in natural gas processing plants. The Dowtherm unit at Carthage Corp. is, by comparison with other Dowtherm installations, a large unit. It consists essentially of two vaporizers, four "users," which are the column reboilers, a surge tank and the charge pumps. The reboilers operate at different temperatures, from 450° F to 600° F. The vaporizers generate vapor at 650° F. The vapor condenses in the reboilers and is returned to the surge tank under pressure, from which it is pumped into the vaporizers. To date Dowtherm losses have been immeasurably small. Temperature control is precise and uniform.

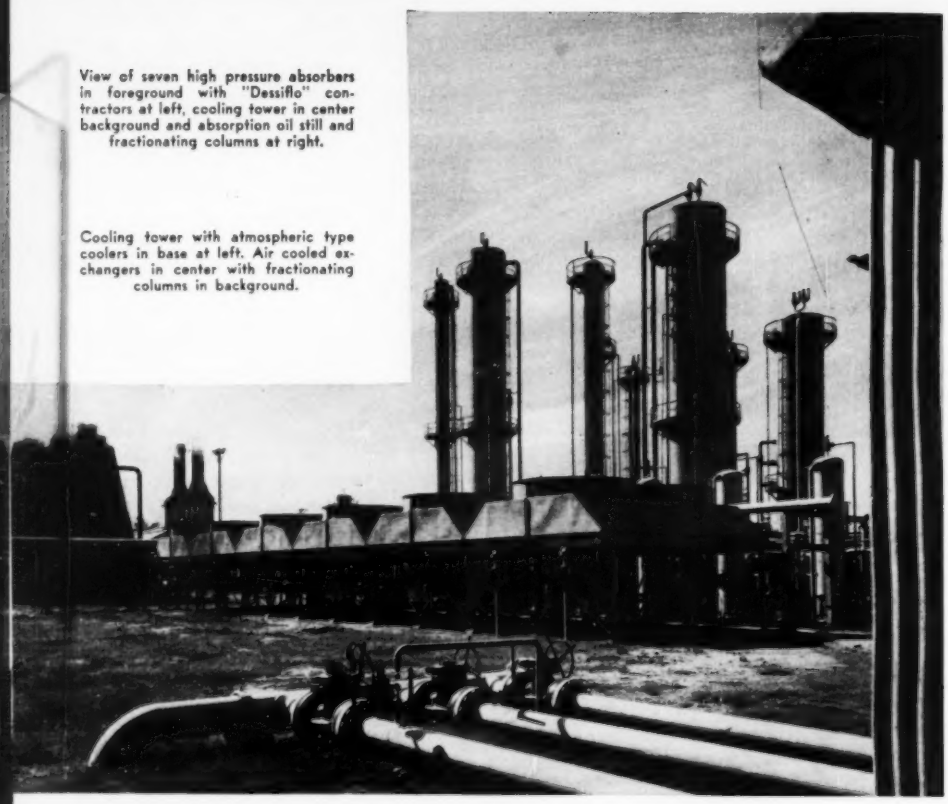
Two steam boilers are installed, one of which is



View of Hudson cooling tower with water pumps in foreground. The cooling tower contains water cooled atmospheric sections in the base. In the Carthage plant use is made of air-cooled coolers, atmospheric water-cooled coolers, and shell and tube coolers, each employed for duties to which they are best adapted.



View of seven high pressure absorbers in foreground with "Dessiflo" contractors at left, cooling tower in center background and absorption oil still and fractionating columns at right.



Cooling tower with atmospheric type coolers in base at left. Air cooled exchangers in center with fractionating columns in background.

sufficient for plant steam requirements. Steam is generated at 600 psig and superheated to 750° F. The high-pressure steam flows to three prime users, the raw water pump turbine, the debutanizer reboiler and the high-pressure absorption oil pump turbine. All other steam for plant use is obtained as exhaust steam at 170 psig from the absorption oil pump turbine. This exhaust steam provides stripping steam for the still and drives all other turbines, which in turn exhaust low-pressure steam used as the heating medium in the depropanizer reboiler, "Dessiflo" reactivator reboiler, distillate propanizer - deethanizer reboiler, debutanizer preheater and the evaporator, which provides boiler feedwater makeup. All steam is condensed and returned to the boilers. Condensed steam from the still is treated in a filter unit to remove oil. The boiler feedwater is deaerated before being pumped into the boilers.

Water is available from wells near the plant in limited quantity and contains a high concentration of dissolved salts, particularly iron and silica salts. Extensive treating is required to render the water suitable for plant use. It was, therefore, necessary to reduce water consumption to a minimum and to avoid the use of water in cooling and condensing services at high temperatures where scaling would be unavoidable. The use of air-cooled exchangers was, therefore, indicated as being advisable for many services. The Hudson type air-cooled exchangers used contain multiple horizontal rows of vertically off-set finned tubes arranged between steel headers. Air is drawn upward across the finned surfaces by large-diameter fans mounted on top of the units. The fans are driven by electric motors operating through speed-reducing gears and connected to the fans with stainless steel drive shafts. Air-cooled exchangers are used in the following services:

Still overhead vapor primary condenser
Debutanizer overhead vapor condenser
Motor fuel vapor condenser
Naphtha condenser
Kerosene condenser
Mineral seal oil condenser
Residuum cooler
Exhaust steam condenser

The water-cooling tower is a Hudson induced-draft type with coil shed base. Atmospheric type coolers and condensers are installed in the base of the tower. These sections are used for heat dissipation at lower temperature levels and to obtain lower final temperatures than are possible with air-cooled units.

Storage for propane, butanes, LPG, motor fuel, naphtha, kerosene, mineral seal oil and residuum is provided at the plant site. Additional storage for leaded gasoline and the tetraethyl lead blending plant are located at the railroad rack approximately five miles from the plant. Five pipelines are provided for transfer of products from the plant storage to the railroad rack and blending plant.

Truck loading facilities for all products are provided at the plant site, which is on U.S. Highway 79, east of the city of Carthage. Railroad loading facilities for all products are provided on a Santa Fe railroad siding near Carthage. In addition to the facilities for truck and railroad shipping, the plant is connected with three pumping stations which transfer its products to three pipelines terminating at Gulf Coast and Mississippi River terminals.

Hudson Engineering Corp., which designed and constructed the plant, has applied for patents on the new process and design features disclosed in this article.

GULF DEDICATES NEW RESEARCH LABORATORY

Geophysical and Geological Research Activities of Gulf Oil Corporation Are Centered at Harmarville in the New Leovy Laboratories which Form a Part of Gulf's 57-Acre Research Plant Employing 1,000 Workers.

S. A. Swensrud, president of Gulf Oil Corp., unveiling a memorial plaque dedicating the new geophysical research laboratories to the late Frank A. Leovy. Assisting in the ceremonies was Miss Helen W. Leovy, daughter of the former Gulf official, and Dr. Paul D. Foote, director of research. Inset at the left is a photograph of the late Mr. Leovy who pioneered in developing Gulf's research.

WITH the opening of the new Leovy laboratory at Harmarville, Pennsylvania, during Oil Progress Week, Gulf Oil Corp. has stepped up its research in the field of geophysics and geology. The new laboratory building containing 126 laboratories and offices provides space for 175 researchers and other workers. Into the new center is flowing geological and geophysical data being gathered by field parties in every part of the world. From it will flow new instruments for geophysical reconnaissance and data for the guidance of both wildcat and development drilling.

Gulf is not a newcomer in the field of geophysical research. Under the guidance of the late Frank A. Leovy, for whom the new laboratory has been named, the company began the use of geophysical methods a quarter of a century ago. The company was one of the first to import the embryonic seismograph of 1924 from Germany where it had been originated. The first oil field to be located by the seismograph, Moore's field, was discovered by Gulf in Texas.

In 1925 the Geophysical Research Corporation was formed to become the first geophysical contractor in the United States, and Gulf employed the first seismograph party to be fielded by that company in 1926. In the following year Dr. Paul D. Foote joined Gulf to head a Mellon Institute fellowship on production research, thus laying the groundwork for today's research and development department which employs more than 1,000 at the 57-acre center at Harmarville and more than 500 other workers and scientists in various parts of the world.

The Gulf research organization under Dr. Foote was charged by Mr. Leovy with the responsibility of developing improved methods and putting parties into the field to apply these methods. While some companies were making gravity observations with torsion balances or with pendulums that could observe one station a day, Gulf developed improved quartz pendulums that greatly increased both the speed and accuracy of measurement. This newer instrument has, in turn, been replaced by the more rapid and sensitive gravimeter.

In the Gulf gravimeter changes in the length of the spring used to measure the strength of the earth's attraction are observed by making the spring in the form of a ribbon helix so that the bottom of the spring rotates as the spring changes its length. By this simple expedient, changes in length of the spring as small as one-ten millionth of an inch are readily measured.

Gulf has constructed three types of gravimeters, all using the same principle for different purposes. The standard Gulf gravimeter is used in areas accessible by truck, boat or marsh buggy. This instrument weighs 90 pounds. A reading can be made in two minutes. Its sensitivity is one part in one hundred million and in ordinary use its accuracy is three parts in one hundred million. The small Gulf gravimeter weighs only 22 pounds. It is for use in areas which are inaccessible except on foot, on horseback or in small boats. For surveying areas covered by water the Gulf underwater gravimeter is in a water-tight housing and operated by remote control. This instrument can be used in water up to 600 feet deep. In its prospecting for oil Gulf has observed with these instruments half a million gravity stations in all parts of the world.

In an address of tribute to the work of Mr. Leovy given at the time the new laboratories were dedicated, K. C. Heald, Gulf vice president, said that as a result of Mr. Leovy's pioneering spirit the company has been supreme in the field of magnetics from the beginning of the development of these instruments in Germany. First important modifications of the magnetometer were made by Gulf. The air-borne instrument was of great value during the war and since that time has been used widely for rapid and extensive surveys. In the past three years the airborne magnetometer has been used to survey more than a half-million square miles, much of the area being covered by jungle or deep water where other geophysical methods would be impractical or impossible.

Dr. E. A. Eckhardt, vice president of Gulf Research and Development Co., who is in direct charge of the new Leovy laboratories, believes that the past 25 years has seen the invention of the most important instruments which geophysicists of the future will use. For surface or aerial observation of the hidden features of the earth's crust, there are only a limited number of properties to be measured, such as changes in magnetic or gravitational force. Present instruments are measuring these properties. While there will be constant improvement of the instruments as a result of research, Dr. Eckhardt suggests that

greatest advances in the future will be made in the interpretation of records now available from known instruments. It is in line with this view that Gulf is bringing in all geophysical field records to the research laboratories for interpretation and subsequent re-evaluation and study after development has revealed more detailed facts through actual drilling.

Evaluation in a central laboratory also permits integration of results obtained by various methods of geophysical reconnaissance with geological and paleontological data. The rapid method such as the airborne magnetometer may reveal records which, when mapped, suggest a gravimetric study and finally an intensive study with the more expensive seismograph and core drill.

Seventy-four of the building's 126 rooms have been allocated to interpreting of prospecting data which is flown to the laboratory from more than 500 prospecting personnel operating in nearly every continent of the globe. A large center in the building is given over to the correlating of the flood of data received from aerial prospecting crews using the airborne magnetometer.

The new building includes an especially designed fireproof vault on the lowest floor, measuring 17 by 50 feet and guarded by 12-inch thick brick and concrete walls, a reinforced concrete ceiling and floor and automatic fire doors. This room will house Gulf's key chart collection, representing more than two decades of oil prospecting and valued at many millions of dollars. Cabinets in adjoining vaults hold thousands of preliminary prospecting reports.

All of the geophysical instruments used by Gulf field parties are built in the Leovy laboratory. This enables the department to make constant changes in design as research reveals methods of improvement. Instruments used in the field are returned to the laboratory at regular intervals for disassembly, inspection and reconstruction.

A field of research which may prove highly fruitful in the discovery of future oil reserves is that of sedimentation, and here, too, Gulf is undertaking an active program. Dr. Eckhardt and his associates recognize that the magnetometer, the gravimeter and the seismograph can only report subsurface anomolies favorable for the accumulation of oil and that much may be gained by regional as well as local studies of sedimentation in selecting areas where stratigraphic traps may be sought. In these studies, too, Gulf is employing physicists to aid geologists and paleontologists. This field of research actually is so young that most of the physicists assigned to the studies have an experience history averaging about one year.

There are a good many in the oil industry who think that the finding of another east Texas field is a dubious prospect. These pin their faith in discovering new oil on the location of smaller and deeper structures which have been overlooked this far. At Gulf laboratories no such dim view of the future of oil prospecting is held by Dr. Eckhardt and his associates. They believe that there is far more room for significant progress in methods of finding oil than in methods of processing the crude after it has been discovered. This view is based partly on the fact that refining research has been intensive for several generations, and great progress already has been made, whereas research is just beginning in the field of sedimentation.

In addition to the normal core analysis methods long used by geological workers, Gulf is making a careful study of clay and shale with modern physical instruments. Researchers at Gulf are using x-ray diffraction patterns, differential ther-

New Leovy laboratories are housed in the F shaped building shown at the lower left.

mal analysis and chemical analysis to identify clays for correlation and other work. The electron microscope is revealing information which was unobtainable a few short years ago.

X-ray diffraction is being employed by Gulf physicists to fingerprint unknown materials. With it the skilled researchers now entering the industry from university laboratories are able to learn the chemical combination of samples from cores and outcrops and thus permit precise correlation of formations unobtainable in any other manner. It may be used as a production tool also in the study of porosity and permeability and in water-flooding operations.

X-ray analysis of reservoir rocks may be used by the petroleum engineer in planning secondary recovery operations because the accurate analysis of minute quantities of interstitial clay will reveal in advance what the effect on porosity and permeability will be of water intrusion. Some clays change their form much more than others when saturated with water, and the susceptibility to change during flooding or other recovery operations may be forecast when the exact composition of included clays is known. The quantities of clays which may have a profound effect on production may be so minute that an analysis method such as x-ray diffraction is essential to success. An important feature of the method is that it does not destroy the samples. Analyses thus may be checked and rechecked again and again in the light of future knowledge, which research may reveal. The method may be employed in the study of the processes of sedimentation for broad research into areas for exploration.

The geological laboratory is equipped with an electric furnace in which clay and rock samples may be heated to 2000° F for multiple-differential thermal analysis. This research tool is being used as a supplement to chemical, optical and x-ray methods for identifying clay minerals by their distinctive heating curves. In combination with x-ray studies the thermal methods permit the solution of complex problems in clay studies.

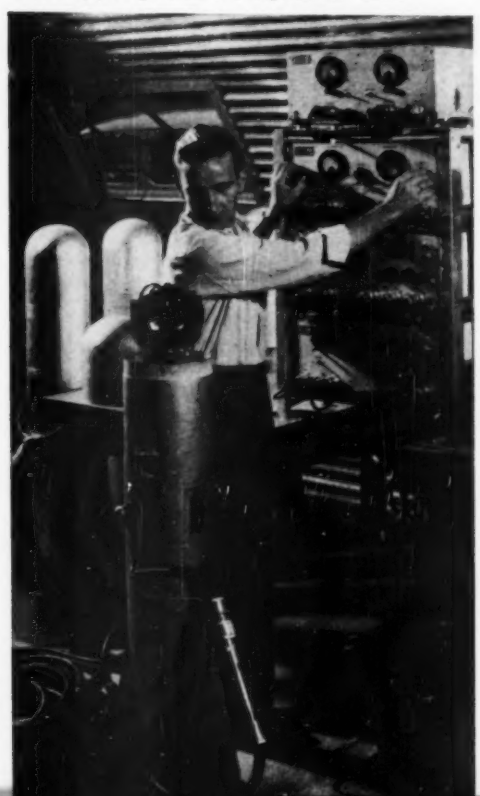
The electron microscope with its ability to magnify more than 100,000 diameters is being used by Gulf to identify and correlate clays. With this instrument clays are identified by characteristic shapes rather than by chemical constituents. The shape and size of particles is, of course, important as a factor in porosity and permeability, but it is impossible to prepare sections thin enough for measurement of sand grains or limestone pores. The electron microscope operator must content himself with a study of cementing material containing crystals too small to be identified under the light microscope. The electron microscope at the Gulf laboratory thus becomes a supplementary tool to x-ray diffraction and other modern physical test methods.

Among the modern electric instruments installed in the Gulf laboratories is a phase equilibrium computer which takes the drudgery out of complicated mathematical problems, and the electrical reservoir analyzer, which is used to predict the future behavior and production of oil reservoirs under various producing conditions. With it the production engineer can select optimum conditions of operation early in the life of a field.

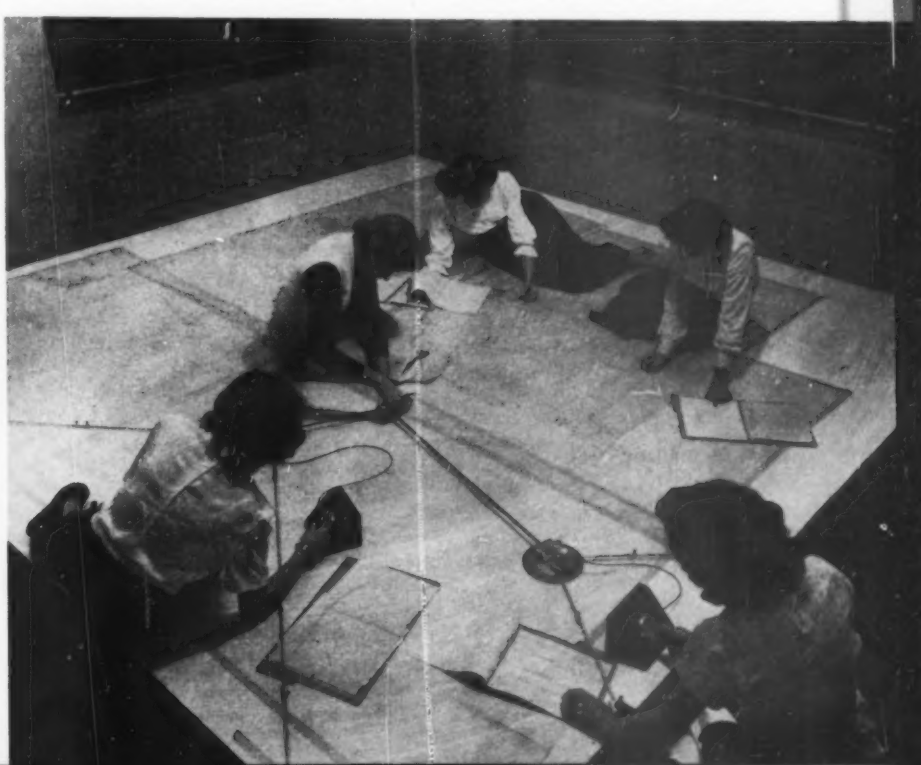
With the magnificent new building and equipment Dr. Eckhardt and his associates look forward to a period of intense study of methods of finding as well as producing oil.

Assembling apparatus for core analysis.

Laboratory pre-flight check of a magnetometer "bird".



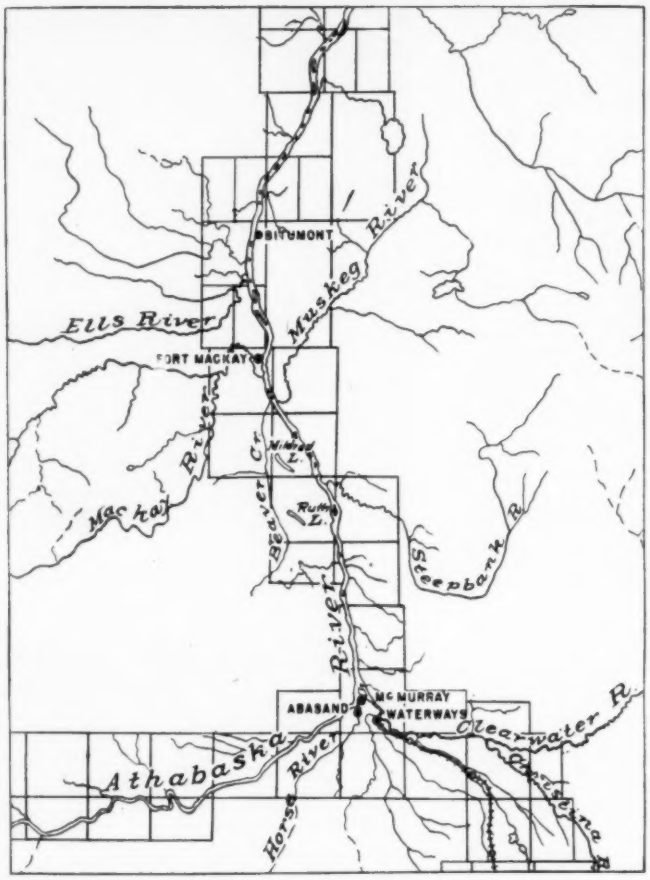
Plotting flying magnetometer data in the laboratory.



Examining clay particles from reservoir rocks.

OIL SANDS DEMONSTRATION PLANT IN OPERATION

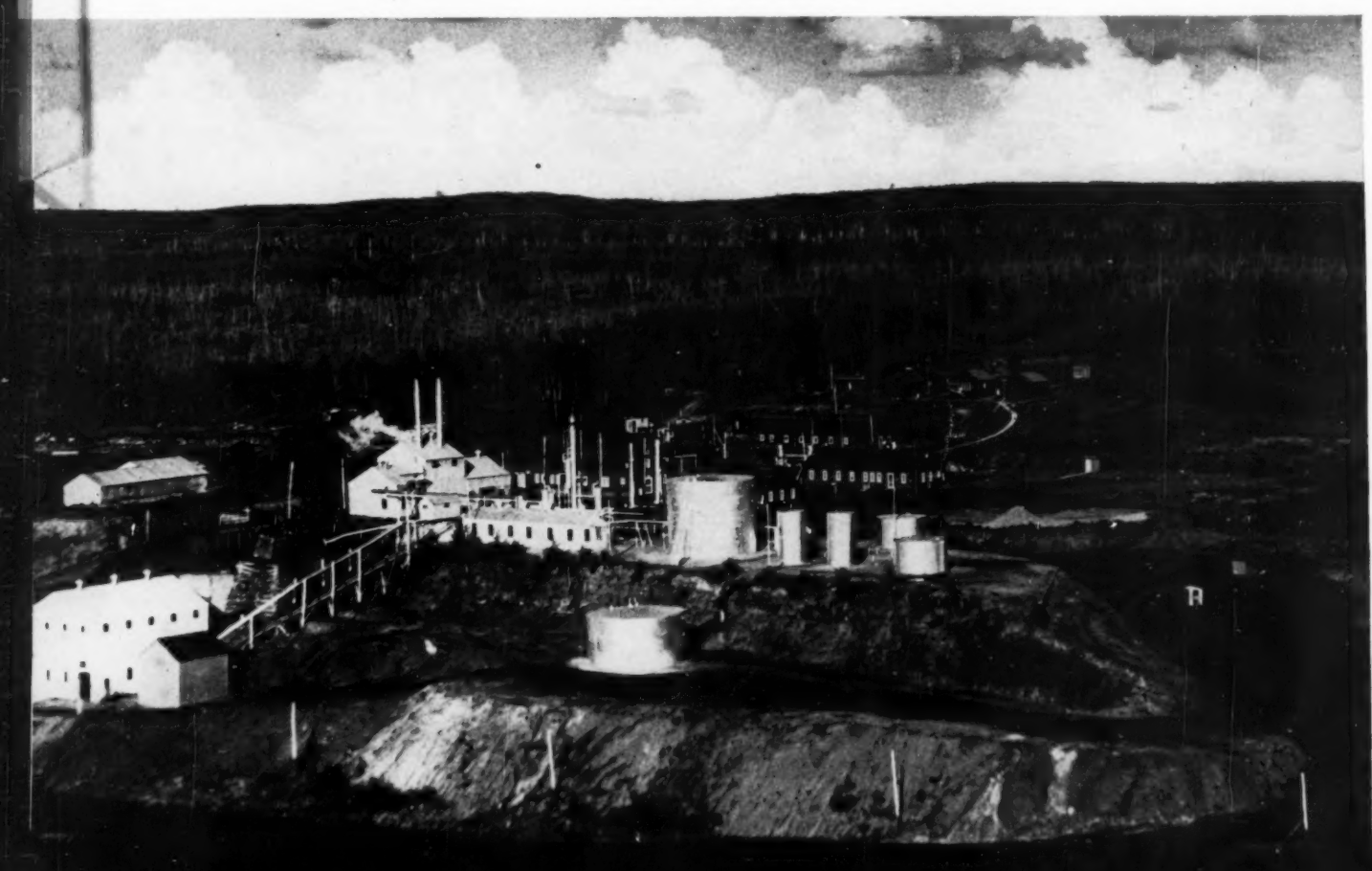
By W. E. Adkins



Map of Oil Sands Area.

W. E. Adkins, technical head in charge of the oil recovery work on Alberta oil sands, is a graduate in chemical engineering from University of Alberta. For 10 years he has studied the problem of recovery of oil from the vast Canadian oil sands and for the past four years has engaged in development work to determine recovery methods which are being applied in the unit described in this article.

Aerial View of Demonstration Plant.



OIL sand deposits extending along the Athabaska River in northeastern Alberta constitute the largest auxiliary petroleum reserve in the world. The purpose of the Alberta government demonstration plant is to study the feasibility of obtaining petroleum products from this source and to obtain the data necessary to permit design and construction of commercial plants when this is economically practical. It is further realized that these deposits would be of tremendous strategic importance to both Canada and the United States in the event of aggression through northern Canada.

In 1944 the necessary legislation was passed to permit the design and construction of a demonstration plant and other necessary facilities. Capacity was tentatively set at 350 barrels per day when charging sand bearing 15 percent oil by weight. The plant was located at Bitumount, as there are large, high-grade deposits there. It was further decided to use the hot water separation process as it was more fully understood than other processes being studied.

Despite numerous previous attempts to obtain oil from this source, little reliable data were available which could be used as a basis for design of a new plant. It was not surprising, therefore, that initial test runs in 1948 were rather disappointing from the point of view of production. A vast amount of information was obtained, however, and by applying this it was possible to re-design various parts of the equipment and eventually achieve very satisfactory results in 1949.

The oil sand deposit is made up of beds of unconsolidated sand, clay and silt containing varying amount of a viscous, asphaltic oil. Unless concentration has taken place due to water drive or other disturbances, it appears unlikely that saturation would exceed 16 percent by weight. The sand particles range from 50 to 200 mesh with varying amounts of smaller particles. Overburden varies from a few feet to several hundred feet in thickness. The oil generally surrounds the sand grains in thin films. It has an average specific gravity of 1.004 and a sulfur content slightly above five percent. One sample showed a viscosity of 1,875 SSF at 122° F.

At Bitumount overburden is relatively light and consists largely of clay and decayed vegetable matter. It is readily removed by bulldozers, scrapers or other conventional means. Mining is done by means of a power shovel, and sand is hauled to the storage bin at the separation unit by means of dump trucks hauling five-ton loads and operating on an eight-minute cycle. The trucks dump directly into the storage bin which has a capacity of approximately 400 tons, allowing all mining to be done during the day shift.

The three feed hoppers attached to the lower side of the storage bin are each connected to spiral feed screws. High-pressure steam, injected continuously at the bottom of each feed hopper, plasticizes the oil sand so that it flows readily into the feed screws and the following collecting screws. The conveyor troughs are steam jacketed so that the sand is gradually heated as it is moved forward into the plant. Hot recycle water is also added to adjust the water content of the sand to 12 percent by weight. The action of the screws reduces lumps and produces a uniform mixture. Screening the mixture removes limestone inclusions and other foreign objects.

The oil, sand, water mixture passing through the screen into the mixer resembles a heavy pulp and is approximately 25 percent liquid by weight. Time of retention in the mixer can be adjusted by means of an adjustable weir at the discharge end. During the mixing period the oil film surrounding each sand grain is broken, and the sand becomes water wetted. The tiny flecks of oil so formed coagulate to some extent and are aerated by the agitating action of the mixer. Since the oil has a high specific gravity, this aeration is important if the oil is to float in the separation cell.

The oil, sand and water in the discharge from the mixer are mixed in the sand distributor with hot recycle water (200° F) being circulated at the rate of 400 gpm. The resulting violent agitation disintegrates any remaining lumps of oil sand and assures the entry of the sand into the separation cell as individual grains, thus preventing oil inclusions. Further aeration also results so that the bulk of the oil enters the cell as buoyant froth which floats readily on the water in the cell. Under the quiescent conditions of the separation cell all but the finest mineral matter particles settle rapidly and are moved along the

Refinery and Dehydration Units.

Mining Oil Sand. Photographs by Courtesy of the Government of Alberta.

bottom of the cell to the foot of a twin screw dewatering conveyor. This conveyor elevates the sand to a point above the liquid level in the cell before discharging it into the tailings receiver at about 25 percent moisture.

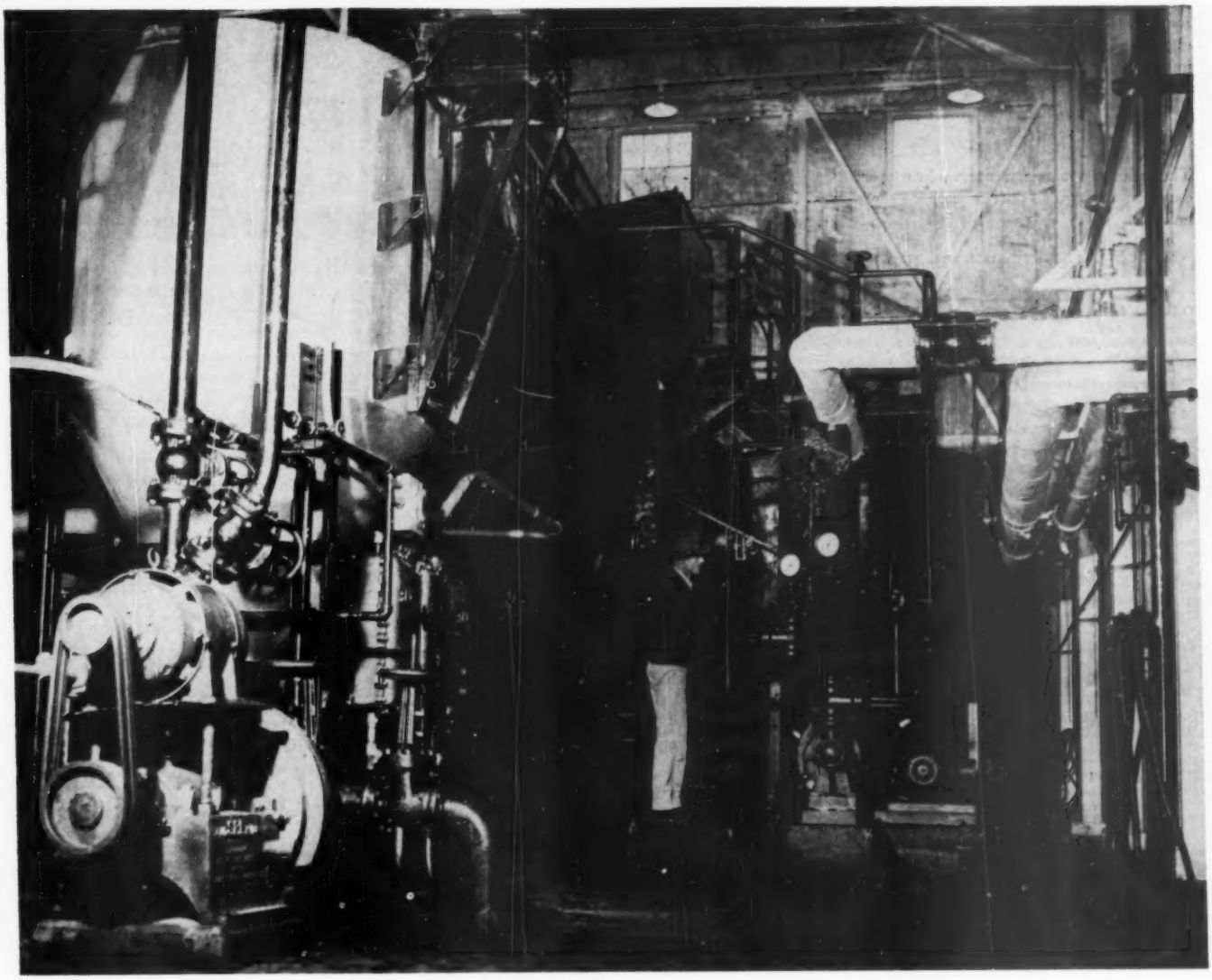
The oil-water interface in the separation cell is maintained slightly below the reach of three sets of rotating paddles which move the oil froth forward and out of the cell over a curved weir.

Large amounts of clay associated with the oil sand have a detrimental effect on separation, both from the point of view of recovery and quality of product. The influence of the clay can be minimized by preventing concentrations of clay particles in the water in the separation cell. Since these particles are very small in relation to the sand grains, their settling rates are much lower, and in consequence they are not deposited completely during the relatively short settling period allowed in the separation cell. To circumvent this difficulty process water is withdrawn from the separation cell continuously and settled in a conventional thickener before being reheated and returned to the circuit. The underflow from the thickener is pumped into the tailings receiver.

Sufficient raw water is added to the tailings receiver to reduce the solids content to about 40 percent by weight. At this density the sand can be pumped for considerable distances providing velocities of eight to nine feet per second are maintained. Velocities as low as 2.5 feet per second are permissible for short runs not exceeding eight to 10 feet of pipe. In actual practice water is added to the receiver in such quantity as to prevent fluctuations in discharge pressure as indicated by a volumetric type pressure gauge at the tailings pump outlet.

The oil leaving the separation cell will contain under normal conditions 25 to 30 percent water and four to eight percent mineral matter. The entrained mineral matter is usually very fine, much of it having almost colloidal proportions. Little of this material settles in the wet oil settler which is a conventional thickener. Under certain circumstances sizable amounts of sand particles are entrained, and these do settle to some extent. The settlings are returned to the mixer as a heavy sand in oil slurry by means of a small pump capable of handling up to six gpm.

As indicated on the flow sheet, several of the bearings are water sealed. The bearing material consists of a strong textile material saturated with a synthetic resin. These bearings are water lubricated, the water pressure prevents the entrance of sand. Periodic inspections have shown no serious signs of wear at these points. Molded synthetic rubber is also widely used in valve seats and pump linings to resist abrasion. By keeping conveyor speeds down, it is not necessary to employ special wear-resisting alloys in this

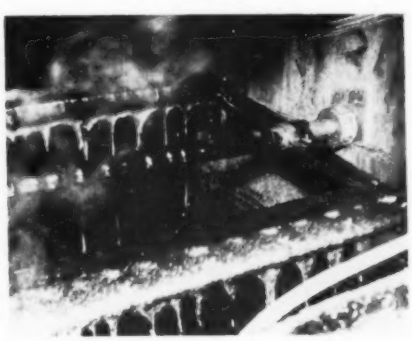


Interior Separation Plant; Tailings Re ceiver and Pump in Left Foreground.

equipment. Due to relatively low temperatures, corrosion is negligible.

To effect the removal of water and mineral matter from the crude leaving the separation unit, the oil is first diluted with a 30° API petroleum distillate and settled. Initially it was felt that dilution should be maintained at a minimum of 50 parts diluent to 100 parts crude (dry basis). Subsequent experience indicated that the degree of dilution had little bearing on the amount of water settled, whereas the amount of mineral matter deposited was practically the same with dilution rates as low as 30 parts per 100. In other words, most of the water is held in a very stable emulsion. Settling for long periods produces oil of low water content but also produces large amounts of emulsion with corresponding oil losses. It should be pointed out also that none of the regular treating agents are effective in the reduction of these emulsions. If excessive oil losses are to be avoided, therefore, it is necessary to curtail the settling period to the minimum required for deposition of the bulk of the entrained mineral matter. If this is done, the diluted crude overflowing the settler will contain 20 to 25 percent water. In the present plant this is removed by heating to 400° F under 20 to 30 pounds pressure in a conventional tube still and flashing. By means of heat exchange fuel consumption is kept quite low. Any distillate which flashes with the water is recombined with the dry diluted crude from the bottom of the water flash tower.

Skimming Oil from the Separation Cell by Rotating Paddles.



Since the primary object of the plant is to study separation, refining has been restricted to a mild vis-breaking operation having three functions as follows: (1) recovery of diluent; (2) production of new diluent to balance processing losses; and (3) production of fuel oil for use in the powerhouse, refinery heater and dehydration heater.

The dry diluted crude is heated to 825° F under 50 psi back pressure and flashed. The overhead from the flash tower is fractionated into naphtha, distillate, light gas oil and heavy gas oil. At present all three top cuts are recombined as diluent, although this will be discontinued when an adequate stock of diluent has been built up. The heavy gas oil is recombined with the flash

tower residue and the blend used as fuel oil. It might be mentioned that, although all previous information was to the effect that the oil sand crude cracked very readily with pronounced coke formation, no coking difficulties have been encountered.

The following summary covers salient operating data for one typical shift in each of the plant units:

Separation and Dehydration Units

Operating Conditions

Oil sand feed rate	500 tons per 24 hours
Water in feed	11.3% of weight
Steam consumption for heating	2200 lbs./hr. at 8 psi

Temperatures °F (average)	
Screen inlet	110
Mixer outlet	135
Recycle water (at heater outlet)	200
Separation cell	185
Wet oil settler	130
Diluted crude settler	162
Dehydration heater outlet	415
Flash tower	350
Water receiver	100

Pressures—psi	
Tailings discharge	22
Recycle water	21.5
Raw water	62
Dehydration heater inlet	45
Dehydration heater outlet	20
Flash tower	18
Pressure settler	25

Production Data

	Imp. Gal.
Dry diluted crude produced	4,121
Diluent in DDC (calculated from grav.)	800
Dry crude produced	3,321
Diluent added to circuit	949
Diluent loss during settling	149
Crude production per hour	416
Crude production per day	10,000
Net oil production per day (including diluent loss)	9,553

Inspections

	% Water	% Oil	% MM	% Oil Basis	API Gravity	Sp. Gr.
Oil sand feed	11.3	11.0	77.7	12.4	....	....
Separated crude	25.0	68.0	7.0	....	....	....
Wet diluted crude (after settling)	19.3	78.2	2.48	....	10.3	....
Dry diluted crude (to storage)	0.24	97.96	1.8	....	11.6	....
Underflow diluted crude settler	*58.3	13.5	28.2	....	....	1.194
Tailings	....	1.13	(Recovery primary separation 90%)			
Underflow process water settler	....	....	18.3	....	....	....
Overflow process water settler	....	....	0.22	....	....	....

*Contains extra water added to increase fluidity. Actual underflow is of the order of 18% water, 26% oil, 56% mineral matter.

Using the hot water separation process and the subsequent diluting, settling and dehydrating procedure for cleaning up the crude prior to refining, it appears that the net overall recovery will fall between 75 and 80 percent of the theoretical oil in the sand charged. Analysis of the tailings from the separation plant shows that approximately 10 percent of the original oil is lost at this point.

The bulk of this loss is due to failure of part of the oil to float, and this fraction is picked up in the plant water and deposited in the process water settler, whence it is pumped into the tailings receiver. Since the total volume of underflow from the process water settler is small in proportion to the amount of oil combined with it, a secondary recovery operation on this material would be practical and relatively inexpensive. The balance of the losses take place after dilution and during settling.

It seems reasonable to assume that any diluted crude lost during settling would be diluted in the same ratio as the overflow from the settler. Since diluent losses can be obtained from the difference between the amount of diluent added and the calculated amount of diluent in the overflow from the settler, the loss of diluted crude can in turn be calculated. Crude loss in this combination amounts to about two percent of the theoretical oil, leaving a further loss of eight to 13 percent. This would indicate that a portion of the crude is not diluted and is lost as a crude water emulsion or associated with the deposited mineral matter.

To form dispersions or emulsion which will not segregate, one or more of the following conditions must prevail:

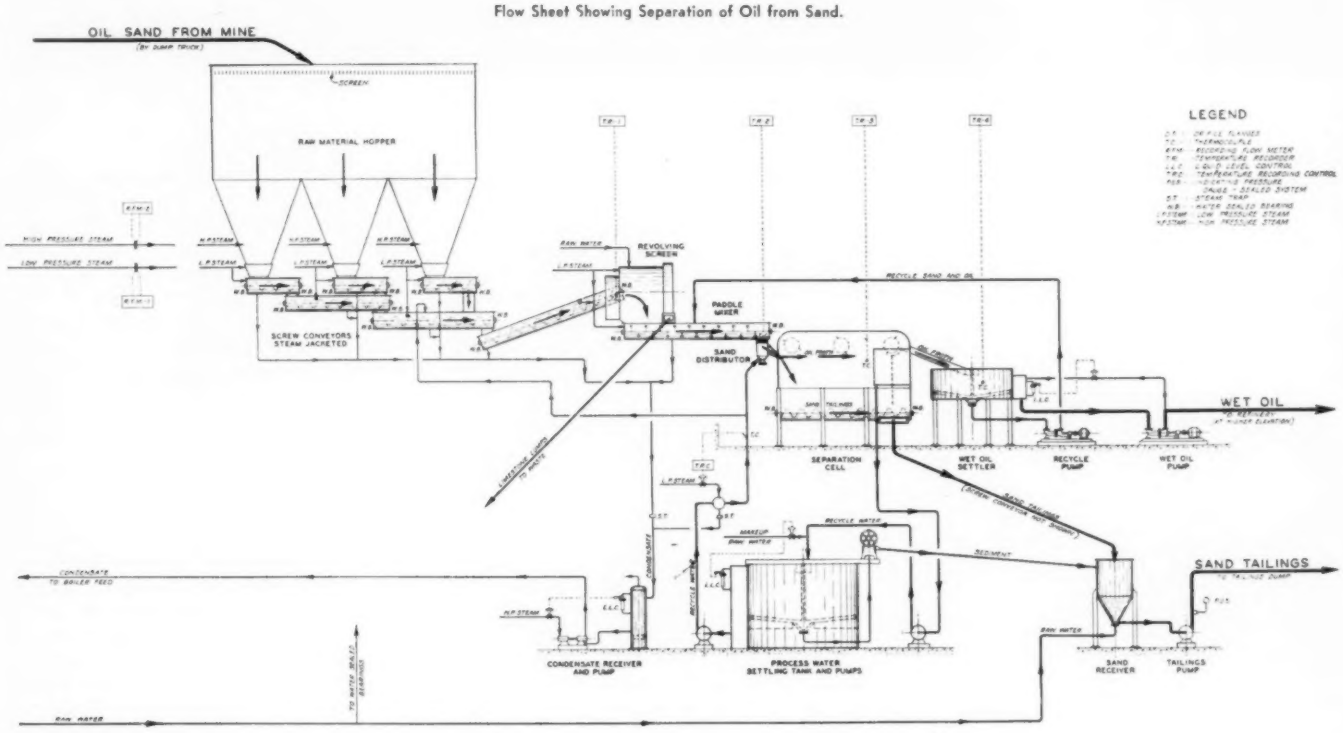
(a) The specific gravity of the phases must be equal or gravity separation prevented by overcrowding in dispersed phase.

(b) The particles must be in Brownian movement due to their small size.

(c) If neither of the above conditions can be fulfilled, the viscosity of the outer phase must be high enough to prevent settling, or

(d) The apparent viscosity of the outer phase must be variable as the stress increases.

Flow Sheet Showing Separation of Oil from Sand.



Obviously in a mixture of heavy asphaltic oil, water and fine clay, at least three of these conditions can be met.

Summarizing the losses which take place after dilution, they are probably divided into three classes:

(1) Crude lost as diluted crude emulsified with water; recoverable by extended settling, but at the expense of greatly increased emulsion deposition.

(2) Crude lost as crude water emulsion; reduceable by restricting settling time and flashing off water.

(3) Crude lost as thin films surrounding mineral matter particles; recoverable by re-processing and minimized by clean separation.

Although a great amount of interpretive work will have to be done before accurate cost figures can be released, the production of oil from oil sands offers substantial basic advantages over the production of liquid fuels from other auxiliary sources such as oil shale or coal. On the present project oil sand is mined and delivered at the plant for approximately 20 cents per ton. It is estimated that on a large-scale operation this figure could be reduced to 10 cents per ton even if hauls were greatly extended. Extreme winter temperatures will increase the cost somewhat, but it would still appear to be well below published figures for oil shale or coal. The capital investment required for plants to produce oil from oil sand would also be much less than those suggested as being necessary to process oil shale or to liquefy coal.

Refinery Operating Conditions

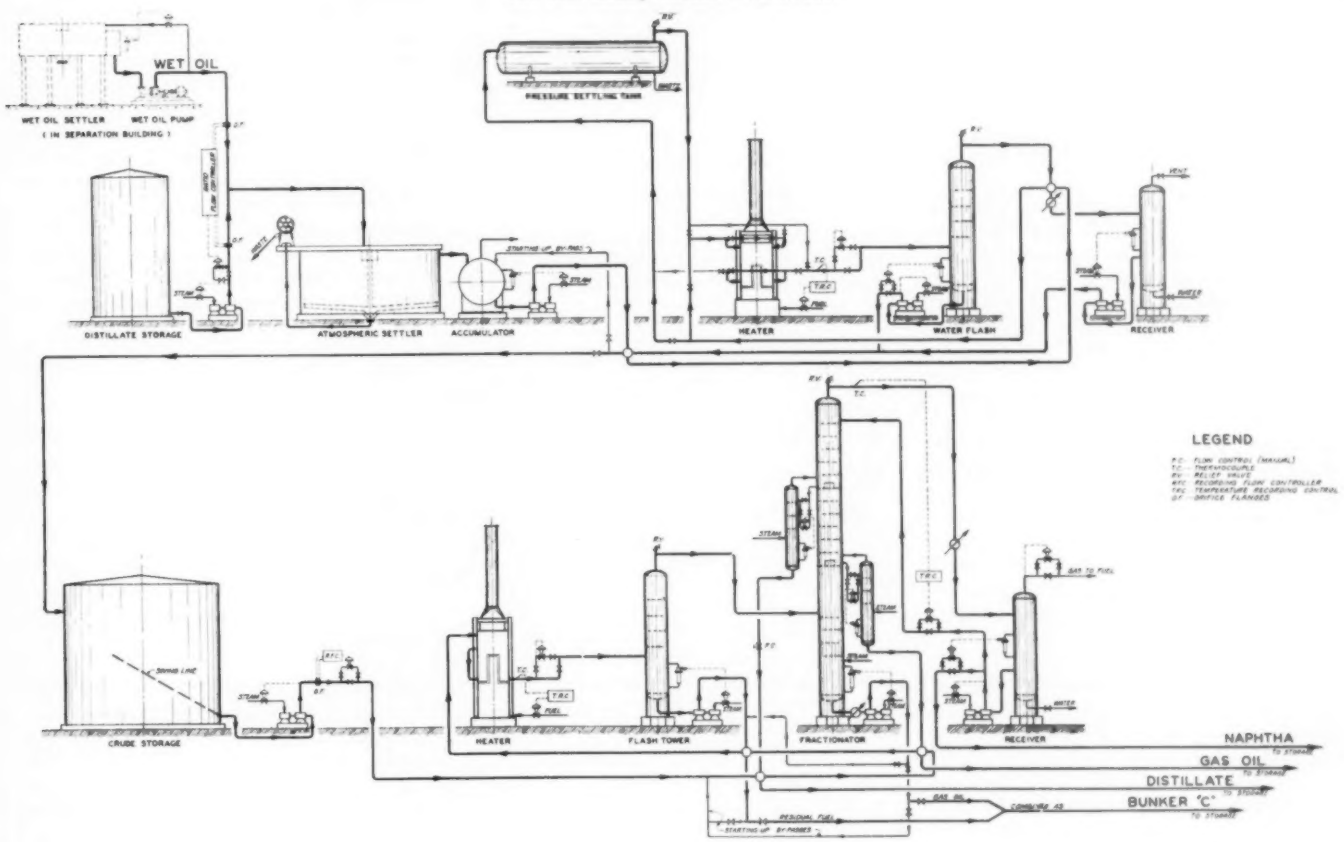
Heater inlet	500° F	85 psi
Heater outlet	825° F	50 psi
Flash tower	700° F	12 psi
Fractionator	Top 390° F, Bottom 590° F	11 psi
Naphtha receiver	100° F	8 psi
Charge rate	420 barrels per 24 hours	
Yields—volume percent of charge		
Original diluent		24%
New diluent		6%
Blended fuel oil		59%
Loss		1%
Charge stock (diluted crude)		
Gravity °API		11.7
B.S. & W.		1.97%
Viscosity SSF @ 122°		100
Naphtha		
Gravity °API		44.5
ASTM distillation °F		
I.B.P.		130
10 percent		278
50 percent		346
85 percent		400
90 percent		414
E.P.		457
Octane number clear		66.8
Sulfur percent		1.3
Diluent		
Gravity °API		30.0
ASTM Distillation °F		
IBP		270
10 percent		404
50 percent		502
90 percent		663
E.P.		720
Blended fuel oil		
Gravity °API		6.3
Viscosity SSF @ 210° F		62.5

The conversion of bitumen to distillate fuels can be accomplished by any of several available techniques used either separately or in combination. In general, the scheme employed would have to involve an upward adjustment of the hydrogen to carbon ratio which is 0.123. This could be done either by adding hydrogen or removing carbon or both. However accomplished, liquid bitumen as a starting material would have decided advantages over coal and would be less expensive than shale oil, though perhaps requiring more drastic treatment.

The entire plant was designed and constructed by the Born Engineering Company of Tulsa, Oklahoma, and Canadian Brown Steel Tank Co. Ltd. of Brandon, Manitoba.

Most of the vessels and steel work were fabricated in the shops of Canadian Brown Steel Tank Company Ltd. The conveying equipment was furnished by Link Belt Ltd., and the settlers were furnished by Denver Equipment Company Ltd.

Flow Sheet Showing Treatment of Oil in Plant.



GOVERNMENT-INDUSTRY RELATIONS MAY BE CHANGED BY HARRIS BILL

By Joseph B. Huttlinger

Washington

WHEN Congress reassembles Representative Oren Harris (D., Ark.) chairman of the oil and gas sub-committee of the House Commerce committee, plans "extensive hearings" on the bill for establishment of a national oil policy which he introduced on Aug. 18.

Mr. Harris explains his proposals this way: "Petroleum is one of the main arteries of our national economic life. Our national security, the welfare of our people and the future of our nation depend upon adequate supplies of petroleum and petroleum products to meet all of our requirements. There is no national policy, nothing as a guide for government agencies and the industry to follow, which condition has resulted in confusion, controversy, bickering and indecision materially affecting this great industry. It is the committee's belief that the time has come when some definite action should be taken to establish broad, general guides which both agencies and industry should follow."

Mr. Harris' petroleum policy council would be inter-departmental. Members would be from State, Commerce, Interior and military departments and from the National Security Resources Board. Interior's representative would be chairman. Other agencies could be named members by the President or the council. A majority vote would decide questions.

The council would "aid in developing, clarifying and coordinating national policies relating to the achievement and maintenance of available supplies of petroleum products, of satisfactory quality, at reasonable prices, adequate for the nation in times of emergency and for the peacetime needs of an expanding national economy."

Specific duties would be "to coordinate, unify, clarify and recommend the formulation (for application within the United States and abroad) of petroleum policies affecting agencies of the government including policies relating to oil." Twelve areas of study are given.

"(1) The development of the United States petroleum industry in order to meet, to the maximum practicable extent, emergency petroleum requirements;

"(2) The development of the petroleum industry in the Western Hemisphere to the extent necessary to meet Western Hemisphere economic and minimum emergency needs at all times;

"(3) The development of the petroleum industry, worldwide, to insure the availability of petroleum products to meet the national objectives of the United States;

"(4) The furtherance of conservation of United States petroleum resources through encouragement of practices to reduce waste and promote maximum ultimate recovery of oil;

"(5) The development of new sources of liquid fuels, including sponsorship by the federal government of research and development on processes for their production from gas, coal, oil shale and tar sands;

"(6) The establishment of reserve stocks of petroleum products sufficient to meet requirements during a transition period from peace to an emergency;

"(7) The encouragement of exploration and development on public lands classified as potential sources of petroleum;

"(8) The encouragement of both public and private research in the improvement of the fuel efficiency of petroleum-consuming equipment;

"(9) The encouragement of protection and dispersal of refining facilities in accordance with national security needs;

"(10) The encouragement of tanker capacity adequate for requirements;

"(11) The supplementation of domestic oil by importation of nondomestic crude oil to the extent consistent with the maintenance of a healthy domestic industry adequate for national needs;

"(12) The development and maintenance of plans for the establishment of an emergency petroleum organization in the event of a national emergency."

An obvious result of the Harris plan would be to end the OGD-NPC relations, which have been in operation since May 1946 to do exactly the job assigned to the new PPC. The Harris bill calls for an industry advisory group, but there is no assurance that this would be of the same nature as the present NPC. Faced with this prospect, it is expected that representatives of the OGD and Walter Hallanan, chairman of the NPC, in testimony on the measure, will suggest that any changes by Congress be directed at strengthening the OGD but preserving the present government-industry relations.

Differences under the Harris bill would be largely of form. Thus the OGD reports directly to the Interior Secretary and the President. The lines of authority are clear. The new PPC would be responsible to several agencies, in fact to all agencies which are members. This could work out, in practice, as responsibility to no agency. Again, the PPC would be a creation of Congress, which the OGD is not, and thus might win more support for its ideas on Capitol Hill. A new feature of the measure suggests creation of an advisory group of state officials. Members of advisory groups would receive $25 a day and expenses.

The OGD is not the only agency disturbed by the Harris plan. The State Department frankly fears loss of its preeminence in foreign oil if the plan were to become law. The Commerce Department fears loss of sovereignty in export controls. The Interior Department is loath to surrender its top place in oil matters. The NSRB balks at bowing to an inter-departmental agency.

Other agencies that may be affected include the Bureau of Standards handling specifications, the Treasury Department handling tax matters, Justice handling antitrust cases, Agriculture advocating alcohol-gasoline, the military handling a a huge buying program, the Navy administering oil reserves, Maritime Commission in charge of tankers, Export-Import Bank handling negotiations for foreign loans and other matters, the Economic Cooperation Administration striving to build up Europe's refining capacity and crude availability, the Federal Trade Commission handling unfair trade practice cases, the Labor Department handling manpower, Interstate Commerce Commission handling oil pipelines, tankcar and tanktruck routes and rates, the Tarrif Commission handling import duties.

Support for the measure is harder to discover and harder to explain than is the opposition. Many agencies which see defects in the plan also see great virtues. A wide feeling that both industry and government would benefit from coordination of government thinking in oil is noticed. While agencies are loath to give up some powers, they see a real need for this. Perhaps, too, the Harris measure as such is not the chief purpose of the hearings; perhaps the purpose is to have a public airing of the problems of achieving a national oil policy.

Mr. Harris seems to think so. He says: "The character of a national petroleum policy as proposed and outlined in this bill can be considered at this time only suggestive because of far-reaching effects. It is far from definitive at this stage, but we believe a basis on which some very definite conclusions can be determined."

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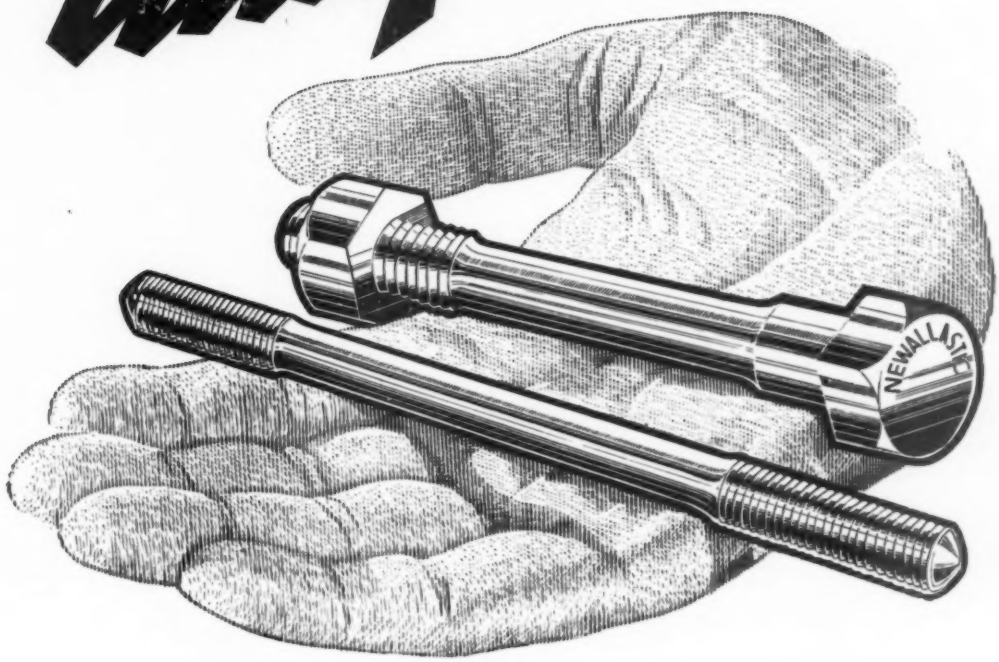

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MEXICAN AMERICAN'S DRILLING WELL UNDER WAY

Mexico City

REPORTS late in November were that the first well of Mexican American Independent Oil Company, Tortugero No. 1, in the Tortugero field, between Coatzcoalcos and the Barra de Tonala, Vera Cruz, tested at the rate of 1,170 barrels at 4,100 feet. This is a directional hole, drilled from the shore and extending out under the Gulf of Mexico.

After delays caused by heavy rains and two major hurricanes with 75-mile winds, the company was ready to start drilling another well about Nov. 30. This is Xicalango No. 1, located near Ciudad del Carmen, Campeche, about 180 miles from the Tortugero rigging. This will be a straight hole. About 100 men are working on these jobs. No further inland work is contemplated until after the rains that have currently made the southeastern Mexican jungles virtual swamps.

Rigs for these on-shore jobs were supplied by Kerr-McGee of Houston, Texas. Pemex geologists reported favorably of zones where the company is drilling and are arranging to drill, as well as the undersea sector they preparing to undertake. Any crude produced from these areas will be run at the Minatitlan refinery, which is of large capacity. Pemex is building a pipeline from that plant over the Isthmus of Tehuantepec to Salina Cruz, Oaxaca, on the Pacific, principal port of southwestern Mexico. Pemex engineers expect this pipeline to be completed in December. Pemex counts upon production from wells which Mexican-American Independent drills to service this pipeline, a prime purpose of which is the regular supply of the Mexican southwest, principally with gasoline. That zone is now being irregularly and expensively serviced by rail, the Tehuantepec National Railway, or by tanker via the Panama Canal. The line will be especially valuable in providing the southwestern area with the gasoline it urgently needs for various activities.

Pemex has drilled 85 productive wells of the 137 drilled in the past 15 months, the producers having a potential daily output of 21,000 barrels of oil and 663,000 cubic meters of gas. Twenty-one of the producers are in new fields. Pemex announced current daily oil production throughout Mexico at 175,000 barrels. It also reported that the monthly average of home sales of its products of 510,000,000 liters that obtained from January to December, 1948, has increased to 543,000,000 liters this year, which has raised the revenue from that source and exports—the figures are total—from the monthly average of 75,350,000 pesos last year to nearly 92,300,000 pesos in 1949.

New wells have increased the proven Mexican oil reserve to an estimated 1,260 million barrels. Gas production of 500 million cubic feet daily is assured for more than 20 years, Pemex said. Tamaulipas gas production alone, the report said, is sufficient to serve the key industrial cities of Monterrey, the Nuevo Leon capital, and Saltillo, the Coahuila capital, and Torreon, that state's cotton town, all farming in the lower Rio Grande belt, and Tampico as well, should that be necessary.

Though the cost of new installations has increased, due mostly to the weakest peso in peacetime, 8.65 per dollar, building of the 30,000-barrel daily capacity refinery at Salamanca, Guanajuato, which will service a wide sector of north central and far western Mexico, is continuing apace, Pemex said. Most of the refinery's buildings have been completed, and 100 kilometers of the pipeline from Poza Rica that will supply this plant are ready. Pemex indicated that the Salamanca refinery will be ready for opening before December.

Pemex announced that it is now paying the Mexican government 28,000,000 pesos monthly in taxes, a new high.

Pemex is affected by the Mexican government's order to all its departments and dependencies to reduce to the utmost their buying abroad as a further means of conserving the monetary stock and available foreign monies. Pemex, though, is hopeful of fulfillment of the assurance of iron and steel works and other manufacturers in Mexico that they can supply it with practically all it needs in the way of equipment and equipment replenishments. It is admitted that the American independents' provision of their own equipment is a big help.

Reports persist here that Pemex is looking elsewhere than to the United States for a loan. Mexico is most prominently mentioned in this talk, although Mexican financiers, among them Luis Montes de Oca, the banker who served as Finance Minister through three successive presidential terms, averred there isn't enough money available in Mexico to provide the fund Pemex says it wants.

Meanwhile, Pemex continues to announce ambitious plans including the building of more refineries and renovation of all the Minatitlan plant's equipment which has long been in service (this refinery having been established by Mexican Eagle years ago). The plan, drawn up by Ing. Carlos L. Corcuera, refineries manager, suggests a plant at Monterrey, Nuevo Leon, the eastern Texas border industrial center. This would give Mexico six refineries at strategic places: Azcapotzalco, D.F. (Mexico City); Tampico, Poza Rica and Minatitlan, besides that at Salamanca, Guanajuato, which is almost completed. Pemex is confident that this refinery system will improve home market servicing 100 percent and also facilitate exports—nothing about the latter having been said by Pemex of late. The Salamanca plant will represent a total cost of 215,201,927.15 pesos, Pemex revealed, adding that it is the most modern in Latin America.

Pemex is using Mexican drillers exclusively in its wells work. That policy was adopted by the late Ing. Antonio Manuel Amor Rios, subdirector in charge of construction, shortly before his sudden death here on October 5 at the age of 60. This rule does not apply to drilling by the American group. Pemex not only has first-class Mexican drillers but Mexican geologists of top-drawer caliber, asserted Ing. Manuel Rodriguez Aguilar, chief of the company's exploration department.

Continuing strife among the oil workers, featuring bloody but not fatal clashes in the Tampico sector and paid newspaper advertisement attacks on Lic. Manuel Ramirez Vazquez, the Labor Minister who is called "the enemy of the proletariat," made by several sections of the union as a prelude to the elections in December of a national executive committee, throw into bold relief Pemex's high payroll—207,082,445 pesos last year compared to 123,377,598 pesos in 1944. The Mexican oil industry's payroll in 1937, last year when the expropriated companies were in charge, was 49,454,000 pesos. The average daily wage is now 19.64 pesos. It was 8.50 pesos in 1937. In 1937 living was much cheaper in Mexico, and the foreign exchange rate was 3.60 pesos per dollar instead of 8.65 at present.

Colima on the Pacific coast has good oil indications, the governor-elect, Gen. Jesus Gonzalez Lugo, who took office Nov. 1, told President Miguel Aleman during an interview here. The incoming official explained that, prompted by rumors of oil indications in Valle de Tecoman, Villa de Alvarez and Laguna de Amela, in Colima, he assigned geologists to investigate. He said that the geologists, Ings. Manuel Santillan and Jose Muro and Espino Flores, a special investigator, reported the mentioned regions very encouraging. Pemex has sent a geological and geophysical party to the zones. If the area develops as Pemex hopes, that will be a new oil zone for Mexico. Pemex sees it as solving much of the supply problem of the Pacific belt.

President Aleman appointed Ing. Jose Colomo to succeed the late Ing. Rios as Pemex subdirector. Ing. Colomo has long been the Pemex coordinator general. His policy will be the same as that of his predecessor in all matters, including construction.

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International News and Notes

Sir John Henry Cunningham

ADMIRAL OF THE FLEET SIR JOHN HENRY DACRES CUNNINGHAM, G.C.B., M.V.O., M.I.E.E., has been elected chairman of the Iraq Petroleum Company and associated companies following the recent retirement of Sir Francis Humphrys who had served as chairman of the company for the past eight years.

Sir John's interest in oil dates back to his service as lecturer on logistics to the Senior Officers' War Course from 1924 to 1927 and was intensified by his study of world oil supply problems and his appointment in 1930 as deputy director of plans at the Admiralty and as member of the Middle East subcommittee of the Committee of Imperial Defense, which brought him into intimate contact with Middle East oil developments in the crucial period preceding the construction of the Iraq-Mediterranean pipelines.

In the course of a distinguished naval career he became Fourth Sea Lord and Chief of Supplies and Transport in 1941. In this capacity he was a member of the Oil Control Board and responsible for planning oil supplies for the invasion of North Africa, the build-up of U.S.A. forces in the United Kingdom and preliminary plans for the invasion of Europe. In 1946 he was appointed First Sea Lord and Chief of Naval Staff. His services as naval officer and strategist have brought him honors and decorations not only from his own country but from others and include the Croix de Guerre from France and the Legion of Merit with degree of Chief Commander from the United States.

B. C. KITCHEN has been appointed purchasing agent of Imperial Oil Ltd. to succeed L. E. Bury, retired. Mr. Kitchen joined Imperial in 1912 in the manufacturing-accounting department at Sarnia. Later he transferred to the purchasing department, and in 1921 he was appointed assistant purchasing agent,

Saudi Arabian Production

Crude oil production in Saudi Arabia during October amounted to 15,092,814 barrels or an average of 486,865 barrels per calendar day, it is stated by the Arabian American Oil Company. Crude processed at the company's refinery at Ras Tanura amounted to 3,103,050 barrels or an average of 100,098 barrels per calendar day.

Crude oil production for the first ten months of 1949 amounted to 146,040,061 barrels, an average of 480,395 barrels per calendar day. Crude run in the refinery for the same period was 39,566,234 barrels, an average of 130,152 barrels per calendar day.

Dr. C. L. Burrill

DR. C. L. BURRILL has been elected a director of Creole Petroleum Corp. Prior to Aug. 1, 1949, he was with the Standard Oil Co. (N. J.) as head of the budget department.

Pipeline Orders Placed

Contracts for supplies and construction totalling more than $41 million have been let to date by Interprovincial Pipe Line Co. for the 1,150-mile pipeline from Edmonton to Superior. Prime contract for the construction of the 450-mile Edmonton-Regina section of the line, where 20-inch pipe will be laid, will be held by the Canadian Bechtel Co., associated with Fred Mannix of Calgary. The 340-mile Regina-Gretna section of 16-inch pipe will be laid by Williams Brothers, who laid part of the Montreal-Portland pipeline and have built large gas lines in Alberta. The 360-mile United States section of 18-inch pipe from Gretna to Superior will be constructed by Anderson Brothers.

New Burma Offer

Glasgow reports indicate that the Burmese government has approached the Irrawaddy Flotilla Co. with an offer of £700,000 payable in sterling, out of exports to Britain, for the confiscated assets of the company. The Burmese government on taking over made an offer about a year ago of £300,000 in non-convertible bonds to cover the physical assets taken over.

If the new offer is confirmed, it will indicate a more realistic attitude on the part of the Burmese government towards the whole question of nationalized industry and has obvious importance on the oil industry activity in that country. The Burmese government is said now to feel the need for foreign technical help and finance, and this may be to the considerable benefit of the oil industry.

Air Survey In Iran

Anglo-Iranian Oil Co. is engaged in a photographic aerial survey of southern Iran. A Bristol freighter belonging to Hunting Aerosurveys Ltd. recently was flown from Britain to the field to undertake a seventh season of this type of survey work. Leader and senior pilot of the expedition is Capt. H. F. Warwick who has previous experience of several similar ventures and was a wartime bomber pilot in the Royal Air Force. The photo manager is Mr. Hutchinson, a veteran of many aerial survey expeditions since 1927, when he explored the upper reaches of the Zambesi River. Later in the year the company's chief survey pilot, Capt. J. S. Saffery, will take charge of a second expedition to Iran to survey other areas.

Refinery Ahead of Schedule

Since construction began, less than three months ago, of the £37,500,000 Esso refinery at Fawley near Southampton, progress has been so rapid, due to the exceptionally fine summer, that work is already over a month ahead of schedule. This promises well for the attainment of the target date, January 1952, when it is expected that the new refinery, a big dollar saver for Britain, with an output of over 5,000,000 tons of petroleum products a year, will be completed.

First phase to be completed this month is a labor camp for the first 750 resident construction workers. This will consist of 12 single-story concrete buildings, communal messhall and canteens as well as a fully equipped, temporary hospital and separate quarters for camp managers and doctors.

By the end of the year facilities for local social events and entertainment, both for the permanent staff of the new refinery when completed and for temporary labor engaged on building it, will be complete. It will include a cinema, seating 500, with a large stage, dance floor, dressing rooms, bar, lounge and billiards and game rooms. Current operations involve the shifting of well over 1,000,000 cubic yards of earth and gravel, the clearing of hedges and several small woodlands, the erection of fences and drilling of six fresh water wells, each 700 feet deep. A permanent, steel-framed building, 800 feet long and 180 feet wide containing all workshops and warehouses as well as all contractors', foremen's and craft offices, equipped with the most up-to-date traveling cranes and the latest types of machine tools, is part of the early work to be done on the 970-acre development area.

Development of D. Joao Oil Field

The president of the National Petroleum Council, General Joao Carlos Barreto, told the press on his return from Bahia that the discovery of the D. Joao oil field is the most important one the DNP has made to date. Work was started in this zone two years ago but required much preparation owing to the nature of the soil and lack of roads. It has only lately become possible to accelerate operations. The oil is lighter than that of Candeias, and is found nearer the surface than anywhere else in Bahia. There are now seven producing zones at D. Joao, the three most important lying at depths of 245, 274 and 312 meters. The known reserves already exceed 11,000,000 barrels, and the effective yield of the 14 wells drilled is 3,000 barrels daily. The limits of the field have not yet been determined, but it may extend to beneath the sea in the Bay of All Saints. One dry hole has been drilled.

General Barreto also visited the work at Mataripe, where the 5,000-barrel refinery should be in full operation by the end of 1950. Mataripe is conveniently located, adjoining the Candeias oil field, and will be connected by pipeline to D. Joao, while oil from the Itaparica zone will be brought in boats up the river Mataripe. Products will be transported by pipeline to the embarkation port at the mouth of the river. The port has been equipped, the district drained and roads built, and 90 percent of the plant is already on site. The M. W. Kellogg Co. is supplying technicians to accelerate the work.

New Type Viscometer

Techne (Cambridge) Ltd., Duxford, Cambridge, England, is producing a new type of industrial viscometer designed by Dr. N. A. de Bruyne, managing director of Aero Research Ltd., for rapidly finding the viscosity of a wide range of liquids. The viscosity in poises is given directly from a stop-watch reading without a density determination and without knowing the volume of the sample of liquid.

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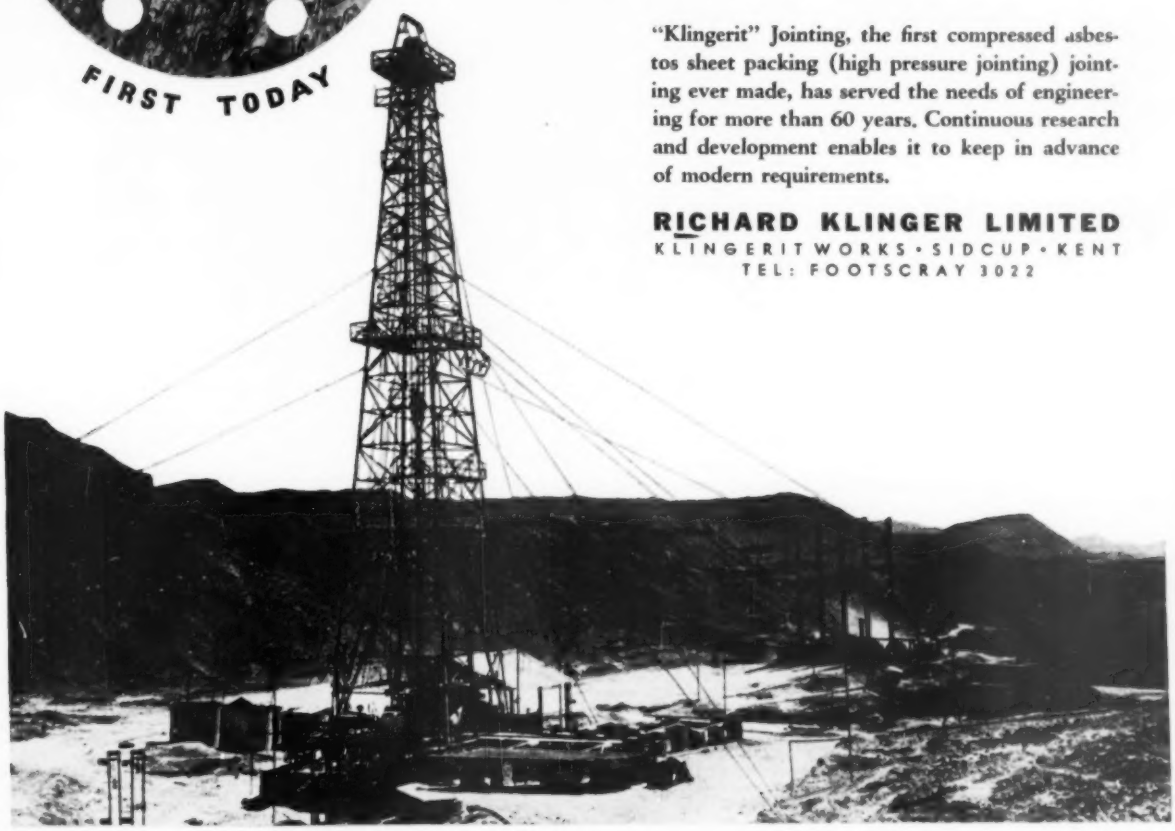

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OIL COMPANY STAFF CHANGES

Mark Gardner

Stanley C. Hope

Mark Gardner Heads Ideco

The election of Mark Gardner as president of International Derrick & Equipment Co., Cleveland, Ohio, was announced by J. B. O'Connor, Ideco chairman and executive vice president of Dresser Industries Inc., of which Ideco is a subsidiary. Mr. Gardner succeeds Oscar M. Havekotte, who served as president from 1940 until his resignation recently. He will make his headquarters in Dallas, Texas, where the company's headquarters are being moved. Mr. Gardner joined the field staff of Phillips Petroleum Co. in 1933. During the war he served 26 months overseas as an officer in the Corps of Engineers. Upon his discharge in 1946 he rejoined Phillips as assistant general superintendent of production, resigning in 1946 to accept the position of vice president of Loffland Brothers and its foreign subsidiaries.

M. A. WRIGHT has been appointed deputy coordinator of Standard Oil Co. (N. J.). Mr. Wright joined The Carter Oil Co. as an engineer in 1933. He was chief engineer and production manager for Carter before going to New York in January 1946 as executive assistant in the producing coordination department of Jersey Standard.

JAMES J. DELANEY has been appointed advertising manager of the Sinclair Refining Co. He was formerly a vice president of Morey, Humm & Johnstone Inc., and prior to that he was an account executive with McCann-Erickson Inc. Mr. Delaney's twenty years of advertising and promotion experience also includes eight years as assistant advertising manager of the Cities Service Co.

EDWARD L. STAUFFACHER has been named assistant to Wm. H. Merritt of Chicago, vice president of Cities Service Oil Co. (Del.) and manager of its marketing division. He was formerly chief engineer and superintendent of operations in charge of the company's marketing properties. Prior to 1939 when he was transferred to marketing, he obtained broad experience in natural gasoline operations, production, refining, chemical manufacture, pipeline and general engineering and construction before becoming superintendent of the company's natural gasoline division.

ARTHUR J. DANIEL, president of the Battenfeld Grease and Oil Corporation, was elected president of the National Lubricating Grease Institute at the annual meeting in New Orleans. He succeeds B. G. Symon, the retiring president. Mr. Daniel has been active in the organization since 1933 when he helped to form the constitution and by-laws of the institute.

STANLEY C. HOPE has been elected president of Esso Standard Oil Co., principal domestic manufacturing and marketing affiliate of Standard Oil Co. (N. J.). Former executive vice president and director of the company, he succeeds M. J. Rathbone who joined the parent company as a director. Dr. H. G. Burks Jr., vice president and director, was named executive vice president.

Mr. Hope is former president of Gilbert & Barker Manufacturing Co. and of Stanco Inc., both Jersey Standard affiliates, and has been a member of Jersey's coordination committee. During the war he was cited for distinguished service by the U.S. Army Ordnance Department for coordinating the work of 21 firms manufacturing sighting and firing devices.

Dr. Burks is a director of Standard Oil Development Co., a member of the coordination committee of Jersey, and during the war was chairman of the Aviation Gasoline Advisory Committee of the PAW.

B. B. SMITH has been elected vice president in charge of operations, and T. W. Wheeler as vice president in charge of contracting of Loffland Brothers Company. Mr. Smith has been actively engaged in the operation of drilling equipment for more than 30 years and has been with Loffland for the past 15 years. Mr. Wheeler recently joined Loffland where he has devoted most of his time to the securing of drilling contracts. He spent 11 years with Phillips Petroleum Co. and resigned his position as general superintendent of the core drill division in 1939 to become a partner and later sole owner of a drilling company. In 1943 he became associated with Kerr-McGee Oil Industries of Oklahoma City.

DR. JOSEPH E. POGUE distinguished oil economist and head of the Chase National Bank's petroleum department, will retire as a Chase vice president at the end of the year but will retain his close affiliation with the bank in a consulting and advisory capacity on a part-time basis. He will continue to have his present office in the Chase Building at 18 Pine Street. Dr. Pogue came to the Chase in 1936 at the invitation of Chairman Winthrop W. Aldrich to organize a petroleum department, a new development in the field of commercial banking. The departmental staff now includes officers specializing in oil loans, as well as engineers, geologists and statisticians with long experience in the oil industry.

JOHN A. ELLEN has retired as assistant comptroller of Gulf Oil Corp., a post he has held since 1933. He has been with the company in accounting and auditing for 40 years. He is succeeded by Wiley G. Robinett, general auditor of refining and marketing operations.

W. H. "BILLY" POTTER, assistant director of sales administration, has retired after 51½ years in Continental Oil Company's marketing department. He joined Continental in Denver in 1898 at the age of 13 as an office boy. He was honored with a dinner on the eve of his retirement.

E. F. FRANZ has been appointed budget director of Gulf Oil Corp. He joined the company's statistical department in 1931 and in recent years has been assistant manager of the general economics and statistics department.

Expands Public Relations

An expanded public relations program has been undertaken by Gulf Oil Corp., according to an announcement by W. R. Huber, general manager of retail market, who has been in direct charge of public relations efforts for the past three years. Three public relations offices will be maintained, one in New York, one in Houston, and a third at the home offices in Pittsburgh. John M. Halliwell will represent the company in the Pittsburgh general office and in the midwest area. Warren M. Drew, located in New York, will direct activities in the east. Don Riddle, with headquarters in Houston, has been assigned the southwest.

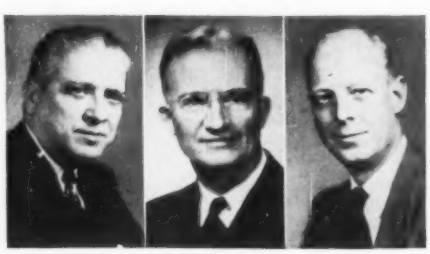
Mr. Halliwell started with the company following his graduation from the School of Business Administration, University of Pittsburgh, in 1935. As a member of the advertising and sales promotion department since that time, he has been engaged in company magazine editing, dealer training and publication and radio advertising. Prior to his present assignment, he was an administrative assistant to the advertising manager.

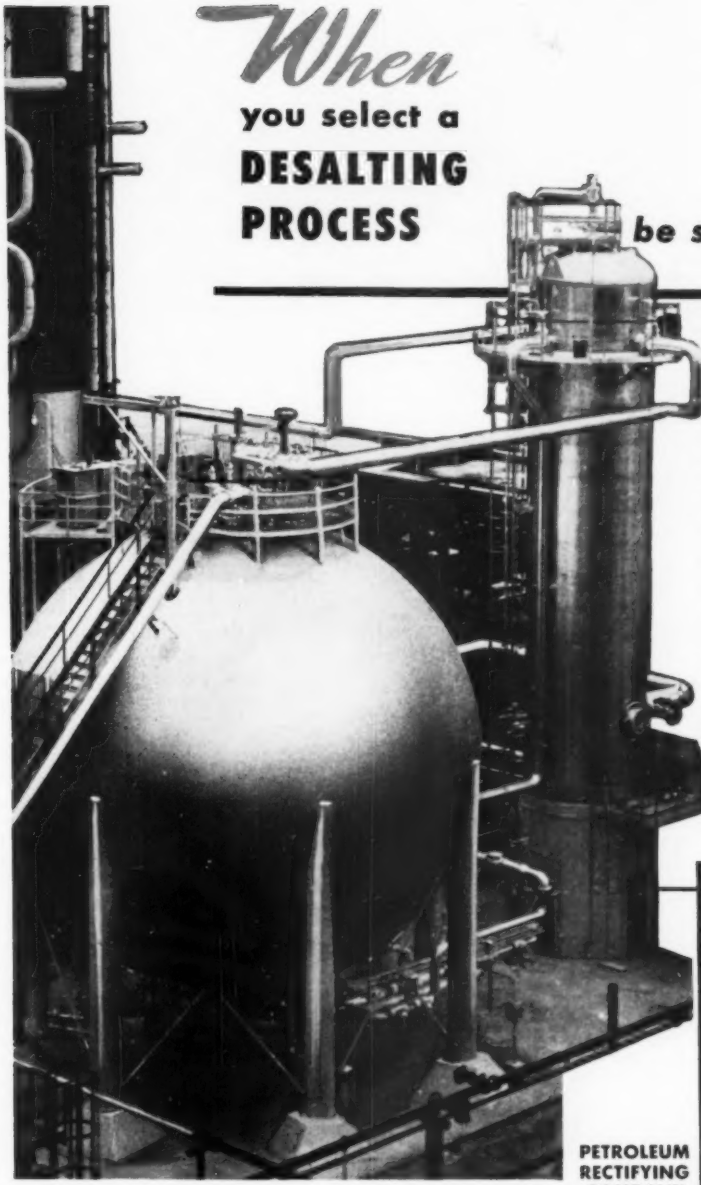
Mr. Drew, an alumnus of the University of Illinois, joined Gulf shortly after his return from World War II. A lieutenant colonel in the Army Air Forces, he saw overseas duty in the Aleutian campaign and with the 14th Air Force in China, serving as an air defense officer. Prior to entering the service, he was associated with the Millis Advertising Agency and the McGraw-Hill Publishing Co. in New York. For six years he was an independent public relations counsel.

Mr. Riddle, a Gulf employee since 1933, came to the company with an advertising agency, public relations, and newspaper background. During World War II he was a lieutenant commander in the U.S. Naval Reserve, specializing in public relations work. He is a graduate of Simmons College, Abilene, Texas, class of 1919; and prior to his present assignment was associated with the company's advertising activities in the Houston division sales office.

Will Schoyer & Co. of Pittsburgh and Young & Rubicam of New York will continue to serve as counsel.

Left to right: Warren M. Drew, Don Riddle, John M. Halliwell





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Dr. Herman E. Ries, Jr.

DR. HERMAN E. RIES JR. of the Sinclair Refining Company Research Laboratories, Harvey, Ill., has been awarded the $3,000 Ipatieff Prize in Chemistry for 1950, it is announced by the American Chemical Society which administers the award. Dr. Ries, who is 38 years old, was cited for his contributions to the knowledge of catalysts used in petroleum hydrocarbon conversion. He will receive the award at the American Chemical Society's 117th national meeting in Houston, Tex., next spring.

Dr. Ries is head of the Physical Chemistry Section of the Sinclair laboratories at Harvey, Ill. He has sought to explain the behavior of catalysts in terms of their basic physical properties, such as surface areas and pore structures. His work on the mechanism of catalysts has contributed to longer life and greater yields of petroleum products.

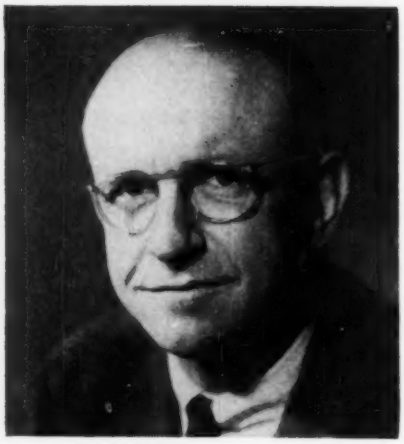
WILLIAM NADEN has been appointed general manager of manufacturing of Esso Standard Oil Co. to succeed M. W. Boyer. William B. Maloney, assistant to the manager of employee relations, succeeds Mr. Naden as manager of employee relations. Mr. Naden joined the company as a chemist at the Everett, Mass., refinery in 1927 and subsequently held positions as general superintendent of that plant and of the Baltimore refinery. After serving as director in charge of refining for District I in the PAW, he returned to the company as manager of employee relations. He was elected a member of the board in 1946.

ROBERT S. BLOUNT has been appointed sales manager of the Boston division of Cities Service Oil Co. He was formerly assistant to the sales manager in the New York office and Cities Service Oil Co. (Pa.), and has held various merchandising, sales and advertising positions with Cities Service since 1929.

ROGER H. SHERMAN, who for the past 20 years has been engaged in oil exploration work for Standard Oil Co. (N. J.) and affiliates, has been appointed coordinator of all producing activities, effective Nov. 1. He succeeds John W. Brice who recently was elected a Jersey director. M. A. Wright, who has headed the eastern hemisphere division of the producing coordination department, succeeds Mr. Sherman as deputy coordinator.

Mr. Sherman has served the company in Texas, Mexico and Venezuela. He was vice president of Creole Petroleum Corp. and coordinator of operations before he became deputy coordinator of producing activities of Jersey Standard in January 1948.

Mr. Wright joined The Carter Oil Co. in the Seminole field in Oklahoma in 1933. After serving Carter in various capacities including those of chief engineer and manager of production, he came to New York in January 1946 as an executive assistant in the producing coordination department of the Jersey company.



M. W. Boyer

M. W. BOYER, vice president and general manager of manufacturing, has been appointed vice president and contact director for manufacturing, supply and transportation and chemical products operations of Esso Standard Oil Co. Mr. Boyer, former vice president of the company in the Louisiana division and general manager of its Baton Rouge refinery, joined the company in 1927 from the Massachusetts Institute of Technology where he was an assistant and associate in the Research Laboratory of Applied Chemistry. He was elected vice president and director of Esso Standard in 1945.

L. R. OWEN will become manager of the foreign shipping department of Socony-Vacuum Oil Co. Inc. on Jan. 1. He succeeds the late J. T. Lockwood. H. R. Arnold, general manager of the company's Levant division, will become a member of the foreign trade committee in charge of Turkey and Greece, succeeding Mr. Owen.

New Diesel Crawler Tractors

Two new and more powerful models of the International TD-18 and TD-14 diesel crawler tractors have been announced by the International Harvester Export Co. Both these new tractors designated as TD-18A and TD-14A, and now in production, have greater work capacities than their predecessors and incorporate a number of new features designed for longer trouble-free operation and increased operator comfort.

The heavy-duty TD-18A, second largest of International's line of five diesel crawler tractors, has 87 drawbar horsepower, compared with 80.5 in the previous model. Drawbar pull has been developed to a new high of 22,400 pounds in first gear with the engine operating at maximum torque, as compared with 21,700 pounds in the TD-18. For greater traction, wider, 20-inch shoes have been made standard equipment. Engine horsepower of the TD-14A, third largest of this crawler line, has been boosted to 76. The new machine has 60.5 drawbar horsepower as opposed to 57 in the old model. Maximum drawbar pull is 16,600 pounds compared with 15,700 in the TD-14.

Heat Exchangers

Standards of Tubular Exchanger Manufacturers Association, 1949 Edition, a 94-page, wire-o-bound book, has just been published by the association. Of value to anyone concerned with the design, manufacture, specification, purchase, operation or maintenance of tubular exchangers, this comprehensive, profusely illustrated volume covers such subjects as: fabrication and performance; mechanical standards for petroleum refineries, commercial and general process applications; material specifications; fouling factors, temperature and temperature differences; heat transfer and pressure drop data; thermal properties of fluids; installation, operation and maintenance; characteristics of tubing.

This edition, the first since 1941, is the work of a committee whose chairman is Thomas H. Miley, manager of heat exchanger dept., Foster Wheeler Corp. Editor is Townsend Tinker, chief engineer of Ross Heater & Mfg. Co. Inc. Other members of TEMA are: American Locomotive Co., The Griscom-Russell Co., The M. W. Kellogg Co., The Lummus Co., Southwestern Engineering Co., Struthers Wells Corp., Henry Vogt Machine Co., Western Supply Co. and The Whitlock Manufacturing Co.

Copies of the book are obtainable at $3 for paper cover editions and $4 for fabrikoid cover editions by writing the Tubular Exchanger Manufacturers Assn. Inc., 53 Park Place, New York 7, N. Y.

Signs Houdry Maintenance Contract

T. Ellwood Webster, president of Catalytic Construction Co. of Philadelphia, announced the signing of a contract for major maintenance with Shell-Berre in France. The refinery's principal equipment is a three-case Houdry catalytic cracking unit with 5,000-barrel daily capacity. The work will be supervised by Oliver E. Benoit, who flew to Paris late in October.

Water Conditioning Booklet

Graver Water Conditioning Co. has concisely outlined its products, services and background in Bulletin WC-100 which has just been printed. The company, a development of the 40-year-old water conditioning division of Graver Tank & Mfg. Co. Inc., has recently expanded its organization in greatly enlarged quarters, including extensive laboratories and a new pilot plant for research in water conditioning for boiler plant, process work and general industrial and municipal use.

New Arc-Welding Accessory Catalog

A new 20-page catalog containing descriptions, specifications and prices of more than 150 arc-welding accessories has been announced as available from the General Electric Company. Designated as publication GEC-253A, the new bulletin includes information on electrode holders, helmets and goggles, tungsten electrodes, all types of protective aids and clothing, electrode carriers, cable connectors, ground clamps, brushes, cleaning tools, fillet weld gage and many other accessories for the arc-welding operator.

Mikita Promoted by Du Pont

Joseph J. Mikita, director of the Du Pont company's petroleum laboratory at Deepwater Point, N. J., has been appointed assistant technical manager in the petroleum chemicals division. He will be associated with John R. Sabina, technical manager. Mr. Mikita was succeeded at the laboratory by the head of its engineering division, Milton H. Campbell. In a third change in division personnel, Iver T. Rosenlund, manager of the company's road testing laboratory at El Monte, Calif., was transferred to Wilmington to engage in technical service work.

Mr. Mikita came to Du Pont in 1946 from The Texas Co. where he served as assistant supervisor of engineering research and as associate director of research. Before Mr. Campbell joined the Du Pont company in 1947, he was engaged in engine research work with the Standard Oil Co. of Ohio.

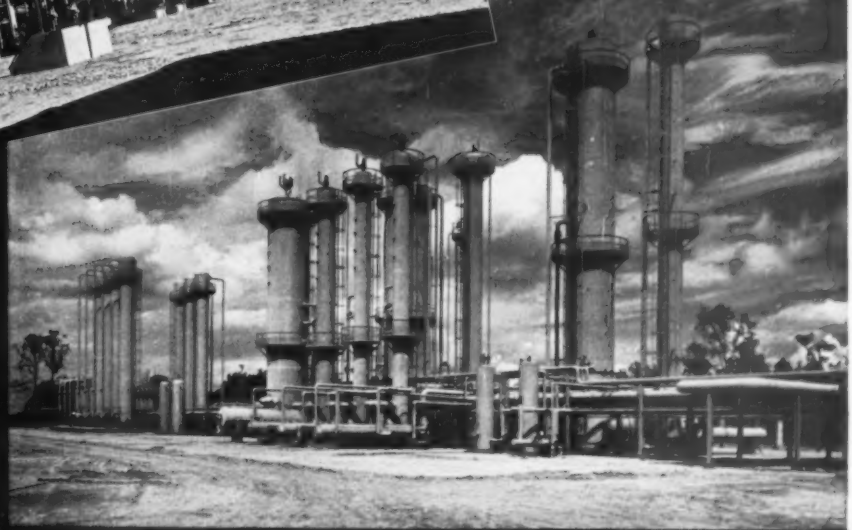
Left to right: Milton H. Campbell, Iver F. Rosenlund, Joseph J. Mikita

At Home or Abroad

REGIE AUTONOME DES PETROLES

In Boussens, France or Carthage, Texas, HUDSON-designed plants justify the world-wide reputation of Hudson Engineering Corporation as leaders in the field of gas processing.

THE CARTHAGE CORPORATION



Pictured above are two HUDSON-designed plants . . . each processing gas to extract propane and heavier hydrocarbons and water vapor from gas entering cross-country pipe lines. The Carthage Corporation plant, largest of its kind in the United States, is installed at Carthage in East Texas. The French plant, owned and operated by Regie Autonome des Petroles, processes gas from the St. Marcet gas-distillate field, in the foothills of the Pyrennes mountains. This is the largest gas processing plant in Europe.

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ENGINEERING CORPORATION

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GAS COMPRESSOR STATIONS • CYCLING PLANTS • GAS DEHYDRATION PLANTS • NATURAL GASOLINE PLANTS • FRACTIONATION UNITS • CRUDE TOPPING UNITS • PRESSURE MAINTENANCE PLANTS • HYDROGEN SULPHIDE REMOVAL PLANTS • ATMOSPHERIC AND VACUUM DISTILLATION UNITS

W. Alton Jones

API Elects New Officers

Following the resignation of William R. Boyd, Jr., who retired as president of the American Petroleum Institute on Nov. 9 after 29 years of service to the organization, the board of directors elected Gen. Baird H. Markham as acting president to serve until March 1950 when the board is to select a permanent appointee. Gen. Markham, who has a wide acquaintance throughout the industry, having been director of the American Petroleum Industries Committee since 1933, was unwilling to take the post on a permanent basis but consented to serve temporarily until the board can decide upon a successor.

At the same meeting the directors selected W. Alton Jones, president of Cities Service Company, as chairman of the board. Prior to his retirement, Mr. Boyd served both as president and chairman.

Other officers elected for the coming year are B. Brewster Jennings, president of Socony-Vacuum Oil Company, treasurer; R. L. Wheelock, vice president for production; Chester Smith of Standard Oil Co. (N. J.), vice president for refining; T. A. Stewart, president of Shell Pipe Line Co., vice chairman for transportation, and J. Howard Marshall, Ashland Oil and Refining Company, vice chairman for marketing.

Phillips Appoints Attorney

Phillips Petroleum Company has appointed Harry D. Turner as general attorney, succeeding R. B. F. Hummer, deceased. Mr. Turner is a native of Oklahoma and received his law degree from the University of Oklahoma in 1931. He engaged in the general practice of law in Oklahoma City until 1937, when he joined the Oklahoma City division of the Phillips legal department, and in 1939 was made chief attorney of that division. His service in that capacity was interrupted by four years of active duty as an artillery officer in World War II, during the latter part of which he acted as a prosecutor of Japanese war criminals in Manila.

Badger Names Executive

Appointment of R. D. Waterman as executive vice president of E. B. Badger & Sons Company, process engineers and constructors, has been announced by Erastus B. Badger, president. Announcement is also made of the election of three vice presidents of the company, a subsidiary of Stone & Webster Inc.: A. J. Broggini as vice president and sales manager in charge of foreign and domestic sales; A. J. Connell as vice president and engineering manager in charge of all engineering, drafting, estimating and procurement; and A. J. Good as vice president in charge of office management, contracts and engineering and construction cost analysis. Mr. Waterman has been associated with the company since 1939 in charge of all construction activities, prior to which he was with Stone & Webster Engineering Corp. for 25 years.

Gen. Baird H. Markham

Wilson Mfg. Co. Representative

Wilson Manufacturing Company of Wichita Falls, Texas, announces the appointment of W. C. Langley, Barranquilla, Colombia, South America, as manufacturer's agent for Venezuela, Colombia, Peru and Trinidad.

Mr. Langley has many friends in South America, having worked in Trinidad and Venezuela as a driller and tool pusher. He has been a manufacturer's representative in South America for about ten years with headquarters in Barranquilla.

New Head for ACS Petroleum Division

Dr. Arlie A. O'Kelly, associate director of the research and development department of the Socony-Vacuum Oil Company, Paulsboro, N. J., has been elected chairman of the American Chemical Society's division of petroleum chemistry. He succeeds Dr. Wayne E. Kuhn, manager of the technical and research division of The Texas Company, New York.

Dr. B. H. Shoemaker of the Standard Oil Co. (Ind.), Whiting, Ind., was named chairman-elect, and Dr. C. G. Kirkbride, laboratory director of the Houdry Process Corporation, Marcus Hook, Pa., secretary-treasurer. The division named the following area representatives: Dr. Cecil L. Brown, Standard Oil Development Co., New York; S. W. Ferris, Sun Oil Co., Marcus Hook, Pa.; Dr. A. L. Lyman, California Research Corp., Richmond, Calif.; Dr. W. A. McMillan, The Texas Company, Beacon, N. Y.; Dr. Louis Schmerling, Universal Oil Products Co., Riverside, Ill.; and Dr. H. M. Smith, United States Bureau of Mines, Bartlesville, Okla.

Engineer Joins Houdry

Edward F. Everett Jr. has joined the engineering department of the Houdry Process Corporation and will serve the corporation in the capacity of senior process engineer. He comes to Houdry from the Marshall-Morman Development Co. where he was engaged for several years as a process engineer. Before that time he was a process engineer with The M. W. Kellogg Company in New York for a period of 10 years.

Natural Gas In British Columbia

Oil men have extended their search for oil and gas westward from the producing fields of Alberta into British Columbia. Natural gas has been found along the Alaska Highway about 20 miles southeast of Fort St. Johns and 25 miles northwest of Dawson Creek. The find was made by a company backed by Pacific Petroleums Ltd., Peace River Natural Gas Co. and Sunray Oil Co. This discovery, announced Nov. 7, is the largest natural gas development in the history of the province. On first test the well produced at the rate of 416,000 cubic feet per day from a Triassic formation at 4,843 feet.

Testimonial Dinner To Bill Boyd

Nearly 200 oil men paid tribute to William Rufus Boyd Jr. at a testimonial dinner at the Stevens Hotel on Nov. 7 on the occasion of his retirement as president of the American Petroleum Institute. The guests were members of the board of directors of the institute and other close personal friends of Mr. Boyd.

W. Alton Jones, president of Cities Service Company, was chairman of the dinner committee, and L. S. Wescoat, president of Pure Oil Company, was vice chairman. Mr. Jones, as master of ceremonies, presented to Mr. Boyd a handsome silver service, a gift of the board of directors.

Later at one of the general sessions a beautiful scroll on parchment, bound in leather, was presented to Mr. Boyd with the signatures of 126 of the institute's directors. The tribute reads:

"To William Rufus Boyd, Jr., who, for thirty years has served the petroleum industry of this country, as an official of the American Petroleum Institute, and as chairman of the Petroleum Industry War Council for which he received the President's Medal of Merit

"Who, with charm, wit, kindliness and friendship has endeared himself to his associates and to all who know him

"Who, not only a stay and ornament of his industry, but also an influence of quality and refinement with others with whom he came in contact, and

"Who, deciding that there has come the time anticipated with regret by many, but begrudged by none, to turn from public to private pursuits

"To this man, William Rufus Boyd, Jr., each of us extends his hand and says: 'Ave atque Vale.'"

LPG Appointments

Appointment of R. H. Mahnke as assistant managing director and K. B. Jacobsen as West Coast secretary of the Liquefied Petroleum Gas Association has been announced by Arthur C. Kreutzer, managing director. Mr. Mahnke will make his headquarters at the organization's executive offices in Chicago, and Mr. Jacobsen will be located in Oakland, Calif.

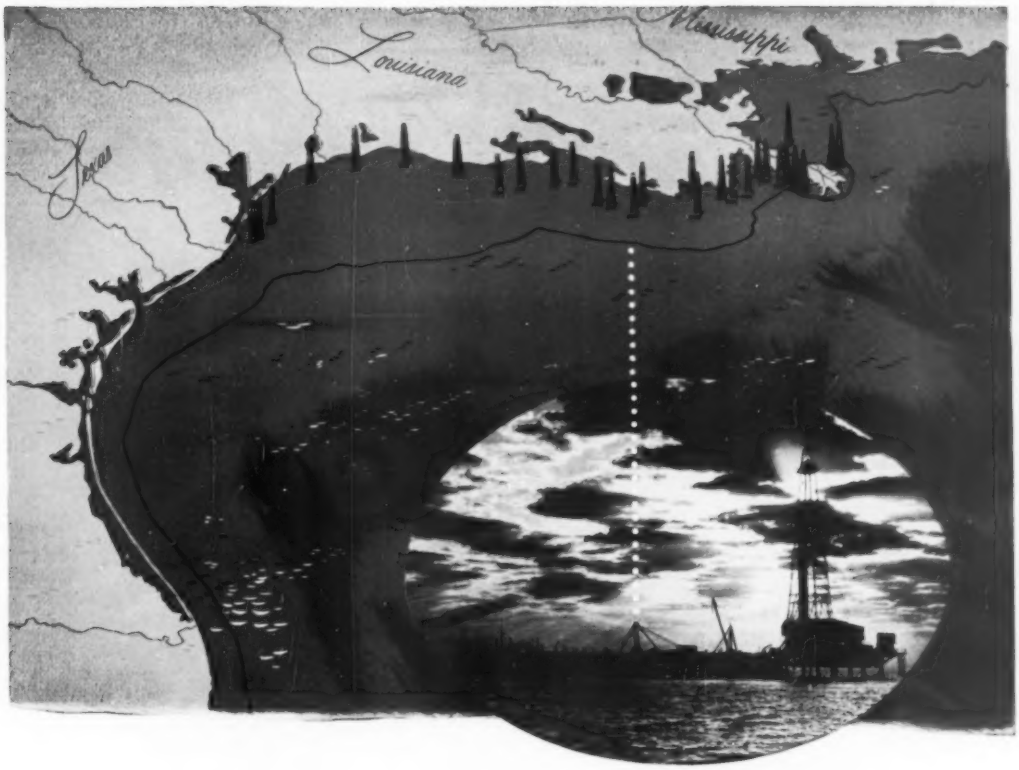
Samuel Hay Wallace

Samuel Hay Wallace, 60, managing director of Caltex (Africa) Ltd., died in Cape Town, South Africa, on Oct. 9, 1949. Mr. Wallace started in the oil business with The Texas Co. in 1913 and spent many years in the foreign operations side of oil distribution. He was superintendent of Texaco Export—African division, and was assistant to the manager of the export department of The Texas Co. prior to March 1930, when he went to Nairobi, East Africa, as managing director.

Prior to taking up his duties with Caltex in 1941, Mr. Wallace had developed the business of Caltex in other areas of Africa, particularly in Egypt and East Africa. His father, William C. Wallace, had been one of the first managers in the early days of the export department of The Texas Co.

New Flame Arrestor

Black, Sivals and Bryson, Inc., have begun the manufacture of a new pressure-vacuum vent valve with a flame arrestor bank which acts to prevent propagation of flame into storage tanks containing volatile liquids. The flame arrestor bank fits into the throat of the VVH pressure-vacuum vent valve and becomes an integral part of the valve body. The arrestor bank, of rolled aluminum construction, can be removed for cleaning or replacement by releasing the retaining ring spring. Rubber-to-metal sealing makes the valve tight and prevents it from freezing shut.



Out where a minute costs three times as much

In the eyes of oilmen, our continent has a shoulder worth exploring. It extends for acres under the Gulf of Mexico. These are the tidal oil lands.

But offshore drilling is averaging three times the cost of dry land drilling. A mile of whirling drill-pipe always has a tricky vibration something like a steel whip. Balanced on a pier in twenty feet of sea water, any shaking is even more dangerous and only the smoothest equipment can be trusted. Diesel power plants, thirty miles from shore, pounded by whimsical storms, must function as dependably as public utilities. Every minute costs dollars.

Go from barge to barge and see . . . the Diesels, the hoists, the drawworks, the blocks, the mud pumps, the rock bits are products of Clark Bros., Ideco, and Security, subsidiaries of DRESSER INDUSTRIES.

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THE ONLY COMPANY DOING AN OVER-ALL JOB } *from well to refinery for the Oil industry— from source to consumer for the Gas Industry*

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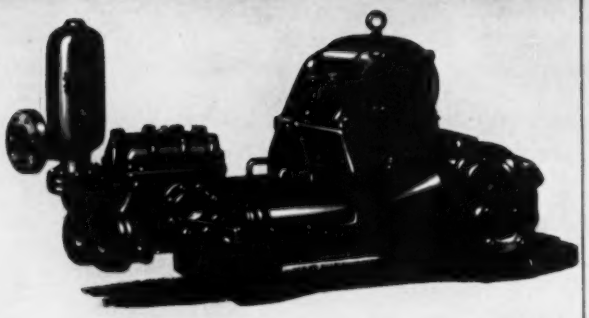
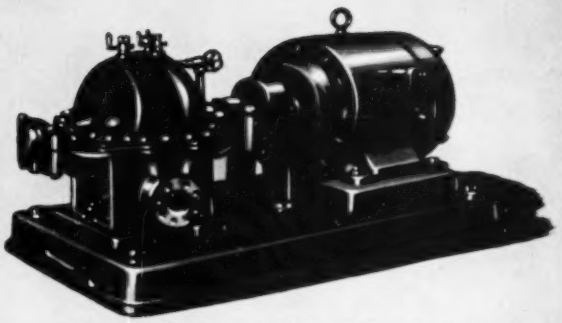
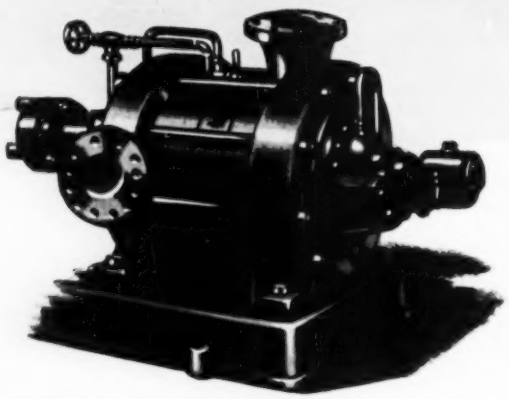
for the Oil Industry



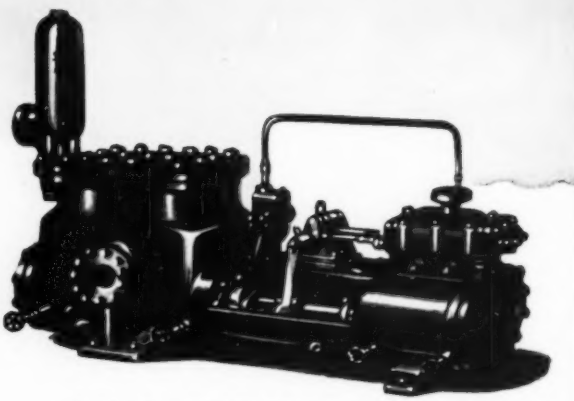
TOTALLY ENCLOSED DUPLEX PUMP for motor or engine drive by gearing, vee ropes or flat belts. A fabricated steel skid type base plate can be supplied if desired. The pump end can be fitted with liners, pistons, valves, etc., to suit any service requirement.



2 STAGE MEDIUM LIFT VOLUTE TYPE PUMP. Made in sizes from 2" to 6" delivery branch for heads up to 250 ft. Normally supplied with cast iron casing and bronze internal parts but special materials can be supplied if desired. For direct or belt drive.



MULTI-STAGE MOTOR DRIVEN PUMPS made in a range of sizes up to 6" diameter delivery branch, with from one to ten stages, suitable for heads up to 1000 ft. Cast iron casings and bronze internal parts. Can be supplied for higher pressures with cast steel casings.



A typical Evans **DUPLEX STEAM PUMP.** Built for extreme service. Can be fitted with removable liners of material to suit all requirements and valve service to suit varying liquids. Simple steam pumps and steam jacketed pumps on similar lines are also made in a range of sizes.

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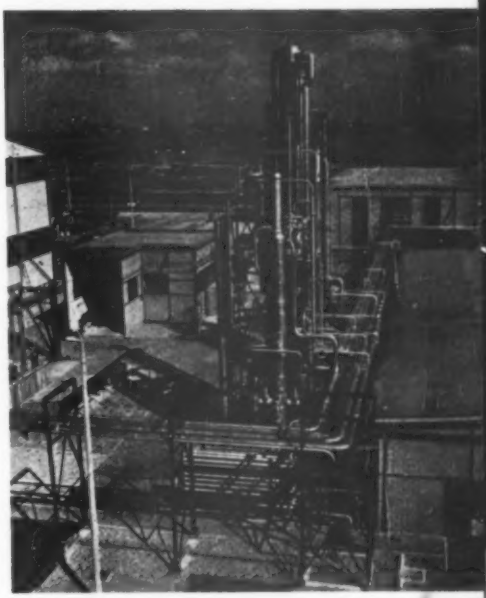
SHELL ESTABLISHES NEW CHEMICAL PLANT

An important new chemical plant was recently opened by the Royal Dutch-Shell Group at Pernis, Holland. It is part of the Group's 170 million guilder ($45 million) construction program in the Pernis-Rotterdam area, as provided for in the Group's overall postwar reconstruction and development plans. It forms a part of the Group's expansion in the chemicals-from-petroleum industry and will produce synthetic detergents from the products of cracked wax and plastics (polyvinyl Chloride synthetic resins) from cracked gases and chlorine. Shell plants in the United States and United Kingdom are already producing a wide range of chemicals from petroleum.

Raw materials for the plant will come from the Group's nearby refinery at Rotterdam, which is at present being enlarged to a capacity of 3.5 million tons per year. The proposed extensions include a distillation unit of 6,000 tons daily capacity, a high vacuum installation, a reforming unit and a catalytic cracking plant of about 3,000 tons daily capacity. The storage capacity is being increased from 700,000 tons to about 1,100,000 tons.

This new chemical project will make an important contribution to the industrialization of the Netherlands, and the detergent section will release scarce supplies of edible fats for food consumption.



Airborne Survey of Saskatchewan

Flying operations have been completed on a survey by the airborne magnetometer of 18 million acres of Saskatchewan territory, on behalf of a group of American oil interests, represented by Tide Water Associated Oil Company. The work was carried out by Aeromagnetic Surveys, of Toronto, Canadian associate of The Hunting Aviation Group, which will produce magnetic contour maps of the area. It is affiliated with the Photographic Survey Corporation in Canada and with the Geotechnical Corp. of Dallas, Texas.

The survey involved coverage of 14,000 line miles in a Canso PB-Y amphibian aircraft and was completed in less than two months. The aircraft was based at Regina and Saskatoon. The Saskatchewan project represents the largest area covered by an aeromagnetic survey to date in Canada. Total value of the contract is in the neighborhood of $100,000.

Appointed Regent Director

Announcement is made by the board of Regent Oil Company Ltd. of London, distributors of Regent and Caltex petroleum products, of the appointment of Rory More O'Ferrall as a director of the company.

Walden Takes ECA Post

George S. Walden, former chairman of the board of Standard-Vacuum Oil Co., has been named as head of the petroleum unit in the Office of the Special Representative in Paris of the Economic Cooperation Administration. Mr. Walden was with Standard-Vacuum from 1934 to 1946 when he retired. During that period he was on leave for duty with the State Department from 1942 to 1944. He was stationed in London as petroleum attache and as a special representative of the Petroleum Administration for War.

Merger Completed

Phillips Petroleum Co. completed final steps in the merger of Wasatch Oil Co. on Nov. 1 when it took over the Wasatch assets. Products will continue to be sold under both the Phillips 66 and the several Chief trade names.

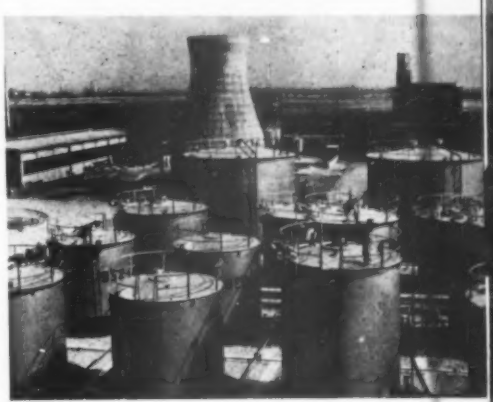
Walter G. Scharmann

Walter G. Scharmann, 45, a senior engineering asociate in the development division of Standard Oil Development Co., died at his home in Westfield, N. J., August 24. During nearly 20 years with the Standard Oil Co. (N. J.) organization, Mr. Scharmann was identified with development of the hydrogenation process, synthetic fuels and the process which resulted in the large-scale production of synthetic toluene.

Esso Shipping Company Takes Over Tankers

The ocean tanker fleet of Standard Oil Co. (N. J.) was transferred January 1 to a domestic subsidiary, the Esso Shipping Company. Esso Shipping Company is being used to centralize all marine operations that have been carried on by Standard Oil Co. (N. J.) since 1944. All activities of the Jersey Standard marine department and shore and sea-going personnel have been transferred to the shipping company.

Esso Shipping Company will own and operate 54 ocean-going tankers, all under United States registry, with a deadweight tonnage of 897,492 tons. Officers of the company are Millard G. Gamble, president; John J. Winterbottom, executive vice president; John D. Rogers, vice president; Clinton DeWitt, treasurer-comptroller, and Edmund A. Flotten, secretary. Mr. Gamble will continue to act as coordinator of all marine transport.



CRUDE DISTILLATION UNIT AT LLANDARCY

The new 40,000-barrel-daily crude distillation unit at the National Oil Refinery of the Anglo-Iranian Oil Company has now been completed and put on stream. The unit is designed to run on Middle East crude and will produce light and heavy gasolines, heavy naphtha, kerosene and gas oil as distillates, with a fuel residuum, and is the first large crude refining unit to be erected in the United Kingdom since the war.

The unit covers about two acres and contains about 2,300 tons of steel above ground. The primary tower is 12 feet in diameter and 95 feet high; the atmospheric tower 16 feet in diameter and 135 feet high; and the pipe still has a rated capacity of 108 million Btu per day.

Erection of this unit necessitated an increase in the cooling water capacity of the existing refinery, which has been supplied by a 20-million gallon per day natural draft cooling tower of the familiar "cotton spool" type. The erection of this tower which is 230 feet high and 163 feet in diameter was concurrent with the erection of the distillation unit. It is on the crest of a hill and is a prominent landmark.

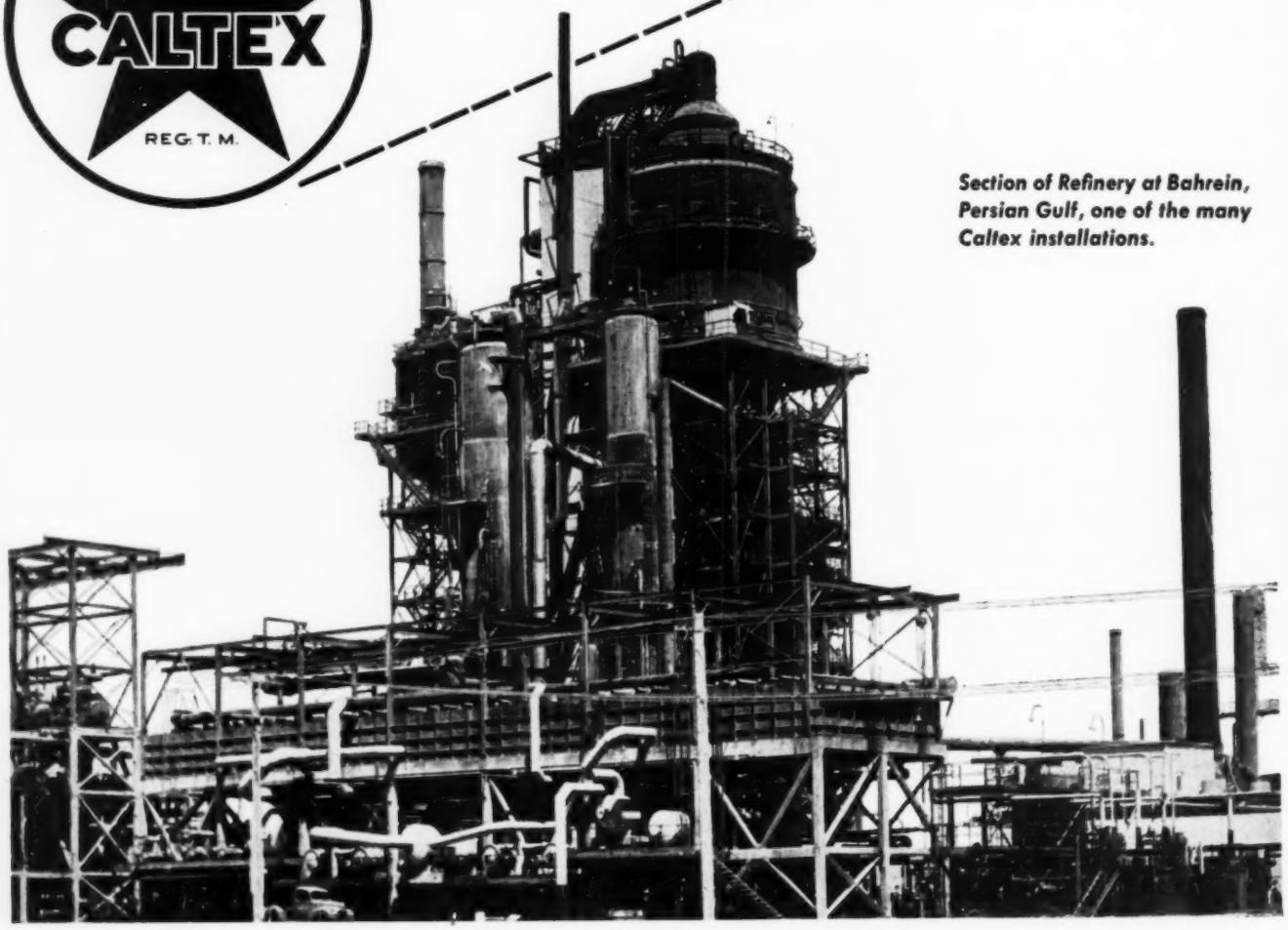
Quality Petroleum Products

for greater operating efficiency and economy in all these world markets...

Throughout a large part of the world Caltex is a trusted name. It is the mark of high quality for petroleum products. It provides convenient, reliable and uniform sources of supply at principal ports and terminals. And the use of Caltex products assures maximum output at minimum operating costs.

Caltex has achieved this position through its vast resources in production and refining. Through its research and marketing facilities. By providing skilled technical aid to see that Caltex quality petroleum products are applied correctly for greater efficiency and economy.

CALTEX
REG. T. M.



Section of Refinery at Bahrein, Persian Gulf, one of the many Caltex installations.

CALTEX PETROLEUM PRODUCTS

Offices in U. S. A.: 551 Fifth Avenue, New York 17, N. Y.

Cable Address: "CALTEX, N. Y."

Left to right: David H. Conklin, George L. Tyler

Left to right: B. A. Hilliard, Jr., O. W. Morgan, Jr.

Correction—Without Apology

In the November number of World Petroleum appeared two articles in parallel columns on page 99. One of these reported the appointment of O. W. Morgan, Jr., as manager of export sales for Byron Jackson Co. and associated companies with headquarters in New York, and of Ben A. Hilliard Jr. as sales manager of the oil tool division of Byron Jackson at the company's manufacturing center in Los Angeles.

The adjoining article related the promotion of two members of the Du Pont organization, that of David H. Conklin, formerly West Coast manager of the petroleum chemicals division, to be assistant sales manager at the main office in Wilmington, Delaware, and of George L. Tyler to be manager of the district office in Los Angeles.

Through some idiosyncracy of the make-up man in the printing plant, the identifying titles under the illustrations (mug cuts, to use the trade term,) were transposed. Owing to the delicate question of whether to extend congratulations or condolences to the gentlemen concerned, the editors decided as the simplest solution to republish the portraits which appear above, this time with the proper designation (so they hope).

William Larimer Mellon

W. L. Mellon, a founder of the Gulf Oil Corp. and its active head for 45 years, died Oct. 8 at his home on Darlington Road, Pittsburgh, after a brief illness. He was 81 years old. On May 26, 1948, Mr. Mellon retired as chairman of the board of Gulf but continued to serve as a director.

Mr. Mellon entered the business of drilling wells and shipping crude oil to market in tankcars in 1889 in western Pennsylvania. Difficulties attending this method of transportation caused Mr. Mellon to build a pipeline to the Atlantic seaboard, thus making him independent of pipelines operated by the companies which then controlled the petroleum situation. He entered Texas fields in 1901 when Spindeltop was discovered. Soon after the Gulf Oil Corporation was organized to consolidate various oil interests, and Mr. Mellon was elected a director and vice president. In 1909 he was elected president. He was elected chairman in April 1931.

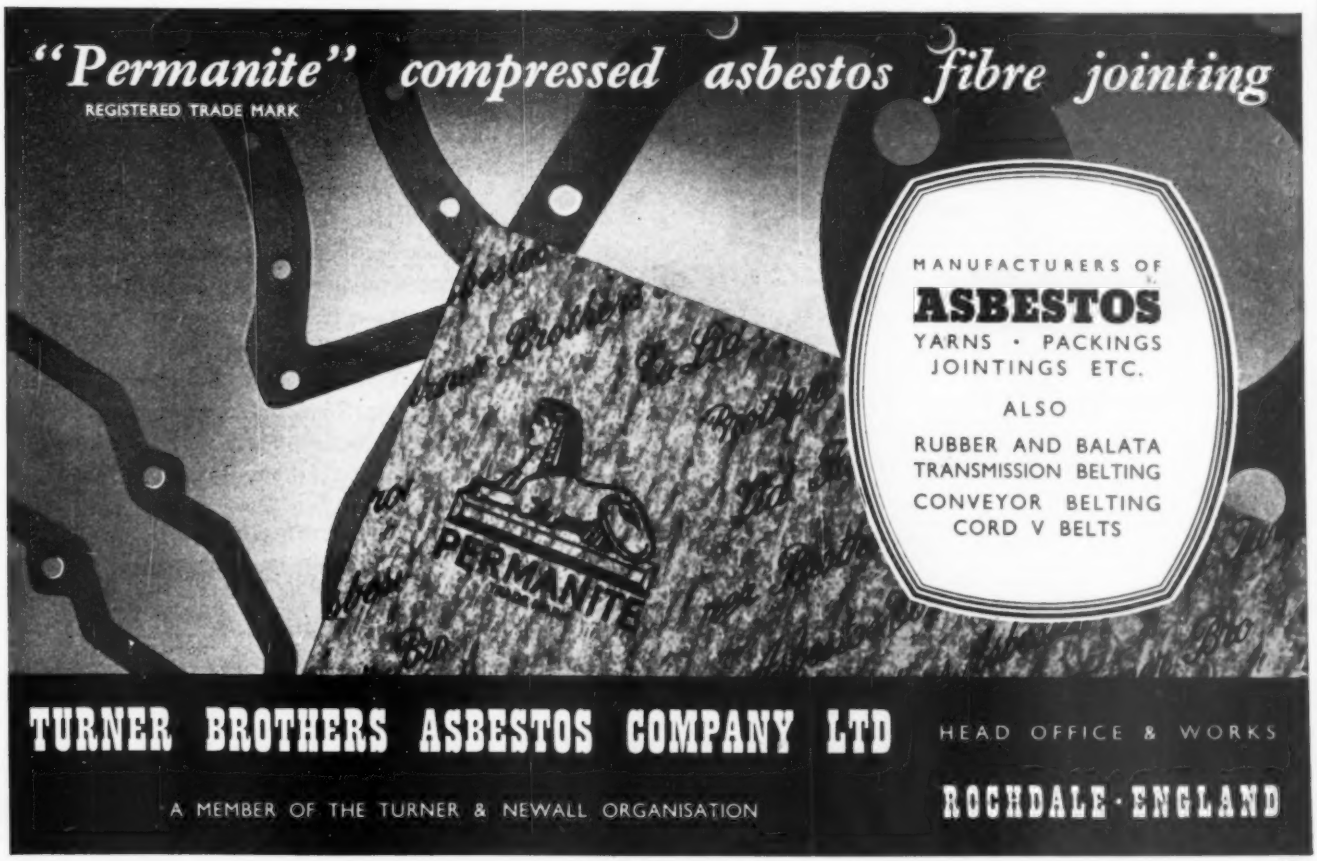
Throughout his life Mr. Mellon took an active interest in charitable, civic and educational affairs. He set up the W. L. and May T. Mellon Foundation, which this year endowed a $6,000,000 Graduate School of Industrial Administration at Carnegie Tech. He had served as a trustee of Carnegie Tech. for 12 years and as a trustee of Carnegie Institute and Carnegie Library in Pittsburgh.

Fluor Promotes Owen W. Gaudern

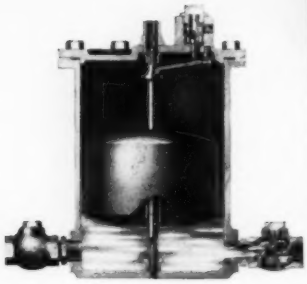
The Fluor Corp. Ltd. of Los Angeles, designers, engineers and constructors for the gas, petroleum and allied industries, has promoted Owen W. Gaudern to manager of purchases. Mr. Gaudern entered the purchasing field with the Neilan Co. of Los Angeles. In 1934 he joined Fluor and a year later was transferred to the purchasing department.

30,000 Shaped Charges Flown To Venezuela

Reflecting Venezuela's fast-moving pace in oil field acticity, 30,000 Koneshot charges were flown there recently. The shaped charges will be used in Koneshot guns by Petro-Tech, Venezuelan affiliate of Lane-Wells, suppliers of technical oil field services. Rutas Aereas Nacionales, S.A., Venezuelan air line, made the flight which took less than seven hours from Miami, Florida, to Maracaibo, Venezuela.



This patent AUTOMATIC PUMP



combines the good qualities of a pressure pump and a vacuum trap. Pumps condensate from low-pressure or vacuum vessels and lifts up to fifty feet; pumps boiling, cold or gaseous fluids (including oils); pumps petrol, benzine, dye liquors and alkaline liquors such as caustic, ammonia, etc.; drains sump holes, pits, excavations (where it may be fully submerged). ENTIRELY AUTOMATIC. *Details of "Ogden's Patent Pump" (in five sizes) from:* OGDEN & CUNLIFFE, (Petroleum Dept.) Charlton House, Cheltenham, Glos., Eng.

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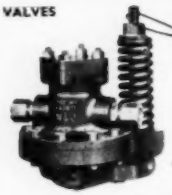
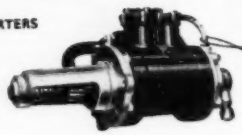


Designed by experts to give a minimum sympathetic pressure drop with variations of upstream pressure. Maximum flow with minimum working drop and absence of pressure creep with no flow. Leaflet No. 43 gives full details.

STARTERS



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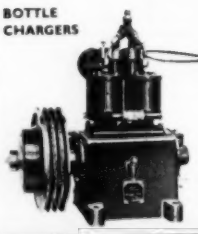

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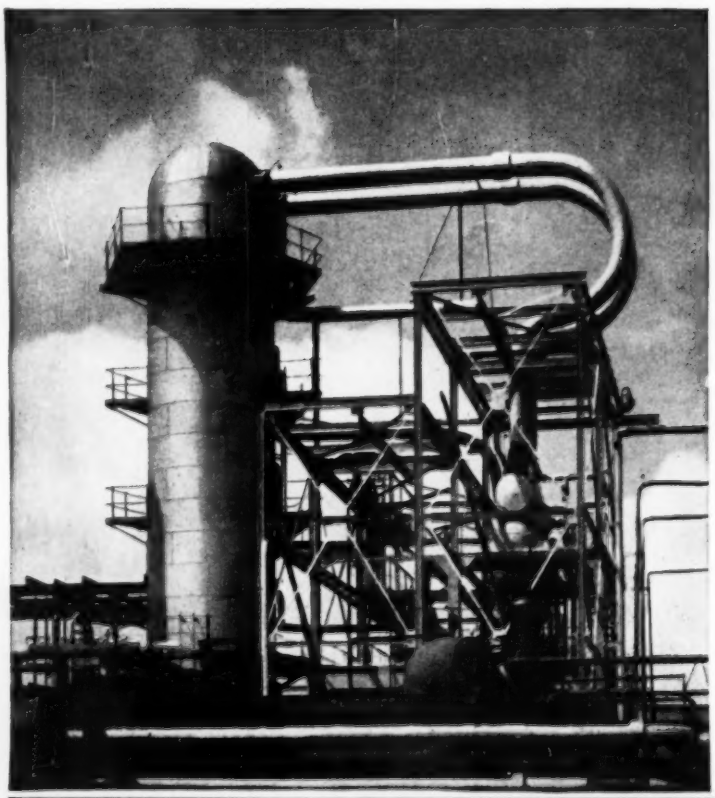

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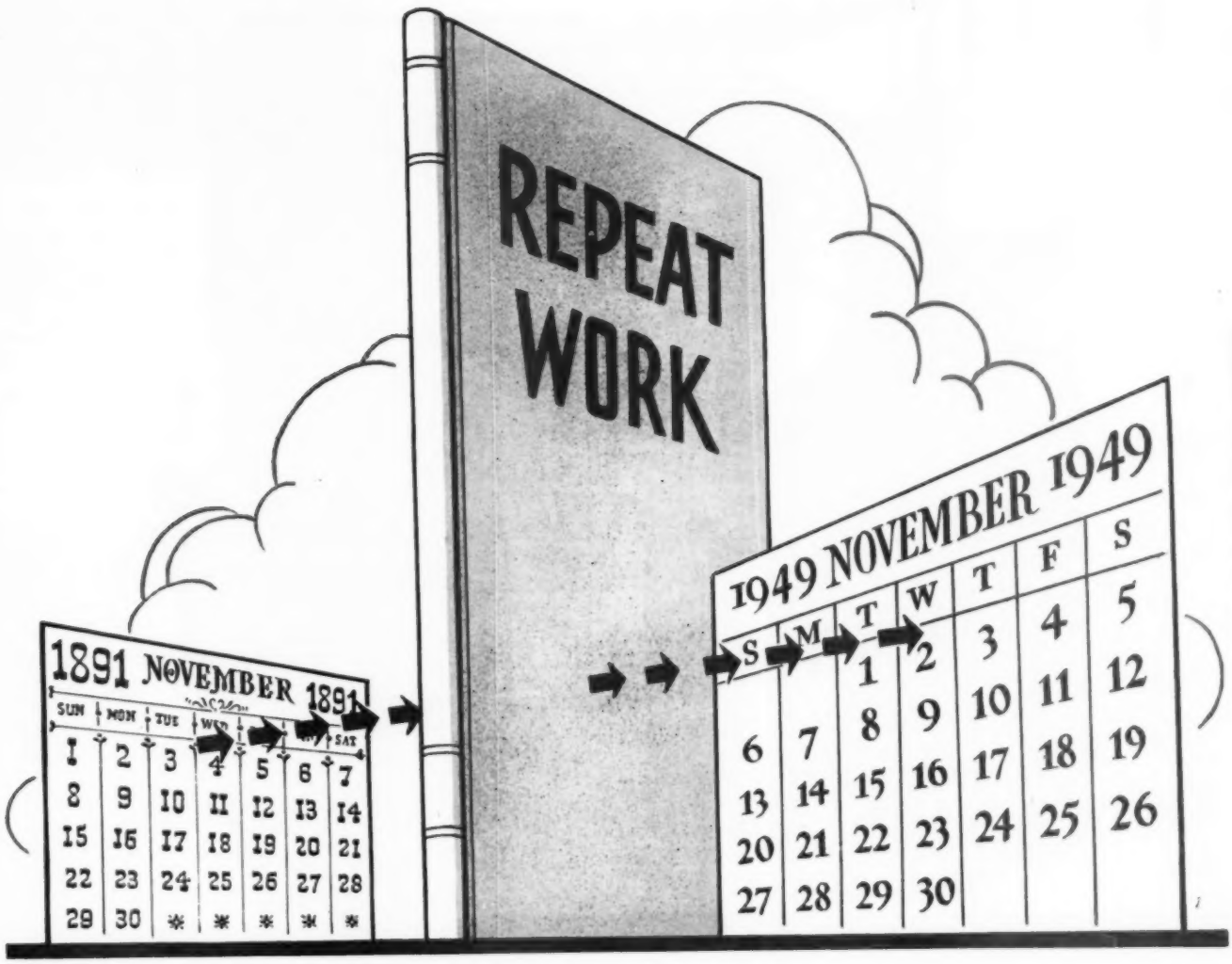

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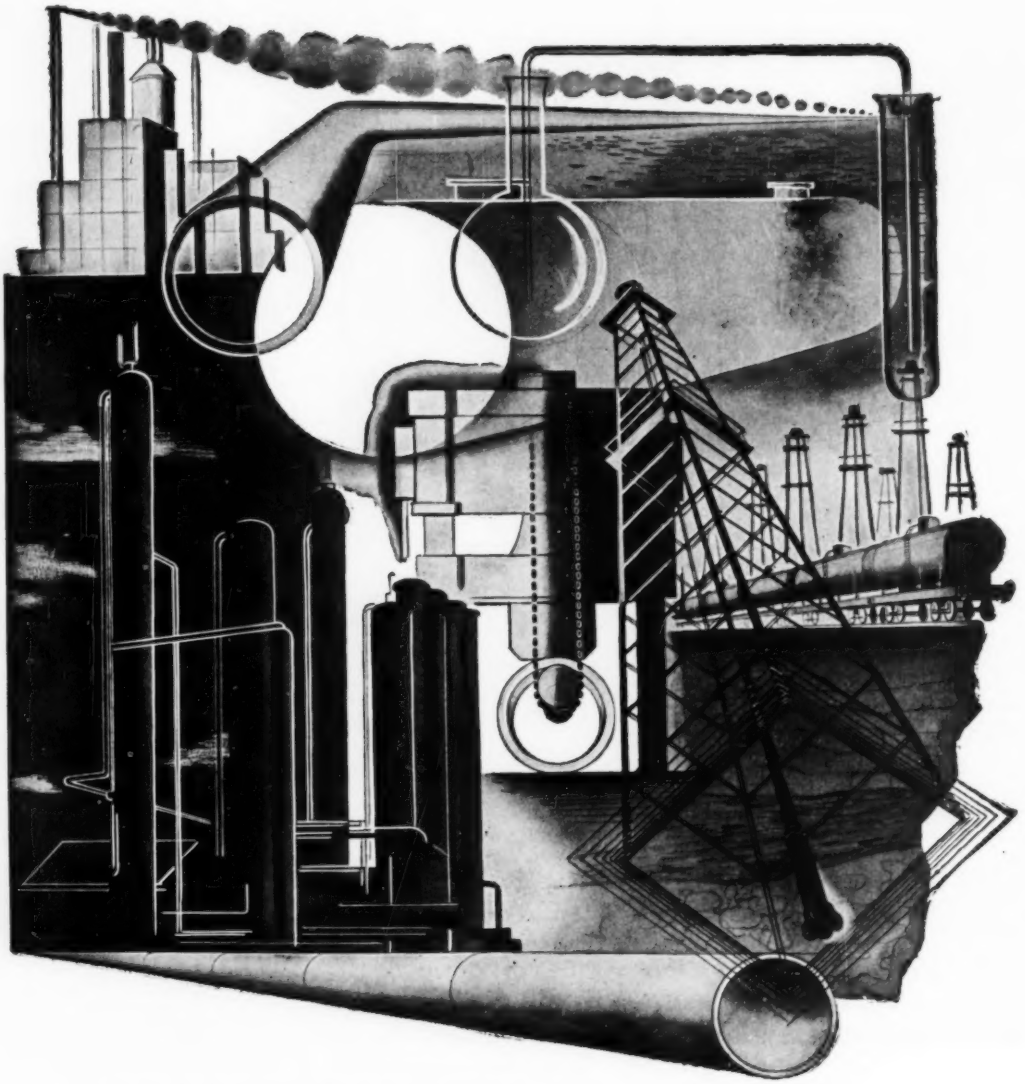

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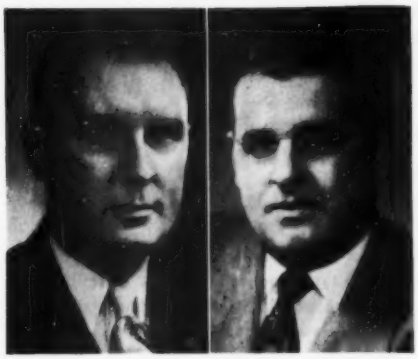

Left to right: Robert F. Hannan, Warren Burns

ROBERT F. HANNAN, formerly executive vice president and secretary treasurer of California Commercial Co., wholly-owned subsidiary of Standard Oil Co. of California, has been elected president. Warren Burns, public relations representative, is now vice president. William E. Burnett, formerly office manager, was elected secretary treasurer.

Except for two and one-half years spent in war service, Mr. Hannan has been in the New York office of California Commercial and the parent company for 22 years, starting his career with the company as a stenographer. Mr. Burns is a former newspaper man. Before serving as an enlisted correspondent in the Navy during World War II, he was in the Washington and New York office of the PAW. Mr. Burnett joined the company in 1946, following four years in the U.S. Navy, both as an enlisted man and officer. While in the latter capacity at Guam, he earned a Pacific Fleet commendation for organization of supply facilities on that island.

WILLIAM G. KING JR. assistant general sales manager, has been elected vice president of Richfield Oil Corp. and appointed general sales manager of the corporation, succeeding the late William T. Dinkins. Mr. King has been associated with Richfield for the past 20 years. He has served in the home office in Los Angeles as assistant general sales manager since 1946.

Increase In Drilling Activity

Presaging a usual year-end upturn in overall activity, rotary rig operations in oil fields of the United States and Canada, reported to the American Association of Oilwell Drilling Contractors by Hughes Tool Company, registered a net increase of 43 active units for the week of November 7 due to noticeable pick-ups in activity in Illinois and Oklahoma - Kansas and despite a decrease of 22 units in the Gulf Coast. The total for the week was 2,106 compared to 2,063 for the previous week, 1,996 a month ago and with 2,448 for the corresponding period a year ago.

New Book

Alcohol, A Fuel for Internal Combustion Engines, by S. J. W. Pleeth; published 1949 by Chapman & Hall, London, W.C. 2, England; 259 pages; 28 shillings.

Although the use of alcohol as a fuel for internal combustion engines is a subject of only academic interest in the United States and other countries that produce enough petroleum for their own use and have some left over for export, it is of live interest in countries which have no petroleum resources but are large-scale producers of sugar from which alcohol for motor fuel use can be made, and much of it is manufactured for this purpose in those countries. For such cases books of this kind provide necessary technical information. Incidentally, the author is chief chemist of a British oil company. He gives a survey of the production of ethyl alcohol from a variety of raw materials and the technique of its use in automotive engines, and closes with a survey of the present status of alcohol as a motor fuel in various parts of the world.

New German Oil Field

Latest oil field in the Emsland district of Germany is Scheerhorn 1 of C. Deilmann Bergbau GmbH. The normal Emsland oil horizon, Bentheim sandstone, was encountered at a depth of 3,670 feet. After a Schlumberger test which indicated an oil-bearing layer between the depths of 3,630 and 3,680 feet, a production test was carried out which showed a flow of 433 barrels per day through a six millimeter valve. The specific gravity of the oil is 0.874. Scheerhorn oil comes from a stratigraphic trap (shoreline), a type of structure which has not been found in the Emsland before. The well is situated approximately two miles to the north of the well-known Georgsdorf oil field and 2.2 miles to the southwest of the Adorf field.

New Book

The Waverly Handbook, 11th edition, published 1949 by Waverly Oil Works Co., Pittsburgh, Pa.; 866 pages, 6½" x 4"; $2.00

This old, established handbook of the petroleum industry, like all good handbooks, follows the habit of becoming larger and better with each succeeding edition. In this 11th edition the editors have broadened the scope of subjects covered, and there is much ground for their claim that it is at least reasonably complete and comprehensive.

The subjects covered are the historical background, refining processes for Pennsylvania crudes and lubes, world production and prices, animal and vegetable oils, gasoline types and refining methods, secondary recovery methods, natural gasoline, fire underwriters' regulations, business law, weights, measures and capacities, workshop formulas and construction data, business and banking information tables and the Waverly formulas.

Establishes Branch Warehouse

Broderick & Bascom Rope Company has established a new branch office and warehouse in Los Angeles, California, to provide factory service to their customers on the West Coast and the southwest. Robert H. Boag is district manager.

Tropical to Leave Colombia

News dispatches from Bogota state that Tropical Oil Company has decided to withdraw from Colombia when its concession expires in 1951. Labor difficulties and disturbed political conditions are held responsible for this decision.

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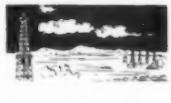

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By Morris Muskat

Chief of Physics Division
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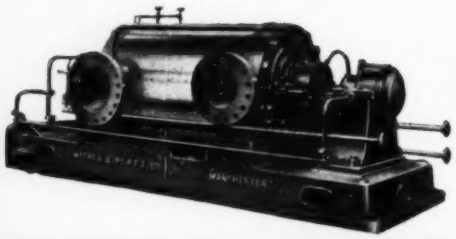
Centrifugal Pumps & FLAMEPROOF MOTORS

Main Pipeline Pumps....



Mather & Platt multi-stage 'Plurovane' pumps were amongst the earliest centrifugal pumps installed for main line work. The pump shown on the left is a typical modern 'Plurovane' designed for a throughput of 50,000 bbls/day of crude oil against a pressure of 750 p.s.i. when running at 1500 r.p.m.

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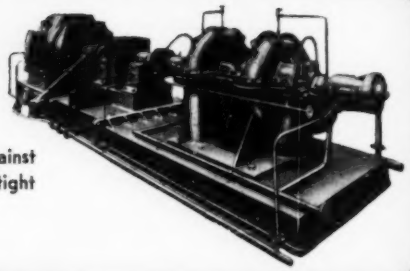
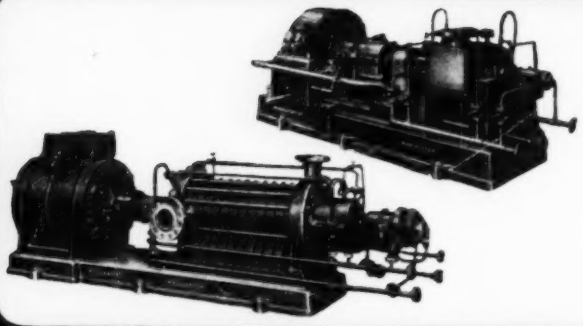
Our standard ranges include a pump for nearly every transfer or loading duty. The two-stage "Medivane" pump illustrated on the right can handle 700 tons/hr. of crude or products against heads up to 500 ft. It is driven through a gas tight wallbox by a 550 h.p. Mather & Platt Motor.



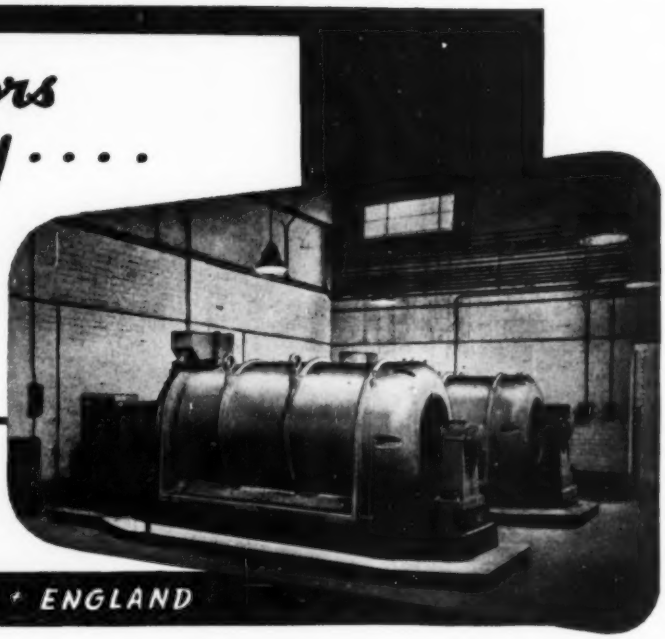
Refinery Process Pumps



Our long refinery experience at home and abroad enables us to supply pumps for the most arduous refinery duties. The illustration shows typical units:—a steam turbine driven pump handling oil at 500 degs. F. and a motor driven "Plurovane" pump dealing with light volatile hydrocarbons.

Flameproof Motors on Pipeline Duty....

Mather & Platt electrically-driven centrifugal pumps on an oil pipe line. The motors here illustrated are of the totally enclosed flameproof type, and are of 1,000 h.p. capacity, fed from a 3 phase 50 cycle 6000/6600 volt supply. They are squirrel cage direct-on started machines with a starting current of four times full load value.



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CHEMICALS FROM PETROLEUM

By Dr. O. W. Willcox

Part II

IN the oxidation of petroleum products the petrochemical industry has had most success with the lower hydrocarbons—those with only a few atoms of carbon in their molecules. The higher hydrocarbons offer more difficulty but also much opportunity for future development. Thus, the oxidation of petroleum wax gives high molecular-weight organic acids. The petrochemists have already accomplished the commercial synthesis of glycerine which can replace much glycerine derived from animal fats and vegetable oils. Now that the higher organic acids can be synthesized from paraffin wax, it is open to the petrochemists to take these acids and react them with their synthetic glycerine to produce the fats obtained from agricultural sources. To that extent crude oil is in a position to make a direct contribution to the food supply. During the two world wars the Germans made strenuous, and to some extent successful, efforts to realize this possibility, but there are still some difficulties to be cleared away.

Petrochemistry is making a very large, though indirect, contribution to the food supply by the production of insecticides and weed killers. Insect pests and fungus organisms which are causes of plant diseases take a high toll from growing crops; food production rises in proportion to the degree of control of these plagues. Petrochemical products are also in the way of freeing large areas of tropical land from the curse of insects that create malarial and other diseases that depreciate the agricultural potentialities of these lands.

Certain petroleum products, first kerosene and later diesel oils, have long been used in direct attack on field insects. More recently these oils have been reinforced with additions of bug poisons like nicotine, roterone and arsenicals. These bug poisons are now being replaced by powerful insecticides made directly from petroleum products, for instance, the popular products DDT and gammexane. These two are mainly for insects that can be attacked above the ground. For operations against insects that inhabit the soil, such as wire worms, grubs (larvae of beetles) and nematodes, petrochemistry has given the powerful soil fumigant D-D, which is a by-product obtained in the manufacture of synthetic glycerine. D-D has restored many a field to full production.

A hardly less important service to farmers—and to food consumers—has been rendered by the production of weed killers in the form of certain petroleum-derived oils. Highly successful in this respect are certain "hormones," among which is the widely distributed "2, 4-D," which have the property of killing certain kinds of weeds without harming valuable crops. This is a boon to producers of grain, who can rid wheat fields of such pests as wild mustard. Petrochemical laboratories are carrying on much work in developing a variety of agricultural sprays; they have even developed one that will prevent the premature drop of fruit.

As it is now shaping up, the activity of petrochemistry in the fields of insecticides and weed killers is preparing happy days for the farmer. DDT, 2, 4-D, D-D and their like can relieve him of large losses. The new weed killers can relieve him of much hard and expensive labor; they give him the easiest and cheapest possible way of keeping his fields clean without use of hoe or cultivator. In fact, the era of "weedless farms" has begun. By persistent use of herbicides for two or three years, a farm can be freed of weeds and kept free thereafter with little trouble, as may be seen in California where clean fruit plantations have not been hoed or cultivated for years.

That the insecticide and herbicide branch of the petrochemical industry is an important one is indicated by the fact that some petroleum companies are maintaining large experimental farms as a part of their research equipment.

Another and large branch of petrochemistry is in the production of ammonia for fertilizers and all the other uses to which this basic chemical substance is now put. Ammonia is a compound of hydrogen and nitrogen. Nitrogen is absolutely necessary for the growth and yield of all kinds of crop plants. Commercial nitrogen for fertilizer has been obtained as a by-product of coal carbonizing, gas works liquors and in the form of Chile saltpeter.

Farmers obtain limited supplies of this vital material from manure and plowed-under legumes, but for good yields they must buy commercial nitrogen fertilizer. The atmosphere contains an unlimited supply of nitrogen gas which can be combined with hydrogen to form ammonia.

The production of ammonia is plainly earmarked for the petrochemical industry by the fact that the cheapest and most abundant source of hydrogen is natural gas. To obtain hydrogen from natural gas, it is necessary to use pure oxygen from liquid air. There are now six concerns which manufacture ammonia from natural gas and air: Phillips Chemical Co., San Jacinto Ammonia Works, Commercial Solvents Co., Mathiesen Chemical Corp., Lion Oil Co. and Spencer Chemical Co. These works were taken over from the government which during the war needed immense supplies of ammonia for explosives.

Synthetic ammonia from natural gas and liquid air can be sold competitively with other forms of fertilizer nitrogen. One reason is that anhydrous ammonia contains 81 percent of nitrogen or four times as much as gas-works ammonium sulfate and is thus subject to small shipping cost. Oil refiners themselves can produce ammonium sulfate by neutralizing their acid sludges with ammonia and thereby relieve themselves of a burdensome waste.

The present production of ammonia from natural gas is about 620,000 tons a year and could be indefinitely increased if the demand warranted.

Another relatively large petrochemical industry is synthetic rubber, of which about a million tons a year were produced during the war. The chief ingredients of synthetic rubber are butadiene and styrene, both of which are petroleum products. The synthetic rubber industry has come to stay; it is competitive with natural rubber and has important uses for which natural rubber is not fitted. The recently developed "cold" rubber has great wearing quality and has become a must for automobile tire treads. Butyl rubber, another petroleum product, is now indispensable for the inner tubes of automobile tires.

In variety and perhaps ultimately also in quantity, the resins and plastics industries are among the largest consumers of chemicals from petroleum, natural gas and refinery gases. The starting materials for plastics derived from petroleum are the olefins—ethylene, isobutylene and others—which occur in large amounts in cracked refinery products. These are convertible, either alone or mixed with other materials, into polystyrene, vinyl resins and polyethylene, and finally appear on the market in such forms as textile finishes, varnishes and enamels, phonograph records, artificial silks, electrical equipment and thousands of others. The plastics like bakelite that were formerly made from coal tar products are now being made from petroleum products; one reason is that the coal industry can no longer supply the necessary base materials in sufficient quantity.

Up to now the main field for plastics has been the production of small articles, as pipe stems, combs and for other small gadgets and functions in the home and in light industry. Articles of greater bulk are beginning to make their appearance. Among these, which promises to run into large tonnage, is pipe, an item that has heretofore been reserved to iron and steel. Pipe made of certain plastics has stood pressures up to 900 pounds. Such pipe has a fourth or less of the weight of metal pipe, is non-corrodible and does not engender electrolysis when buried in the soil. The petroleum industry itself has begun to make use of plastic pipe for low-pressure gathering lines out in the oil fields. Recently a 3,800-foot salt water disposal well in an oil field was cased from top to bottom with a plastic pipe which is now being marketed. Such pipe appears to be indicated for all low-pressure purposes where durability (resistance to corrosion) is a factor as is the case with city gas systems.

(Please turn to page 68)

Another imposing branch of petrochemistry is the so-called "soapless soap" business involving products that are politely dubbed "detergents." A soapless soap or detergent is a cleansing agent that is not composed of an alkali salt of a fatty acid derived from animal grease or vegetable oils. It is a large industry and is approaching an annual output of one billion pounds a year. Petrochemical materials supply a large portion of the ingredients that enter into a composition of these detergents—another instance of the contribution of petroleum to the conservation of food resources.

It has been computed that there are at least 5,000 individual marketable organic compounds for which some kind of petroleum hydrocarbon can be used as the raw material. Of course, the great majority of these 5,000 petrochemical products would have very limited markets. Petrochemical industry is interested only, or mainly, in tonnage products like the common alcohols and glycols for antifreeze, synthetic glycerine, materials for synthetic rubber, ammonia, nitrogen fertilizer, explosives, insecticides and herbicides, detergents and basic prime materials for plastics. In producing these principal items, there are also produced some by-products that can be disposed of in respectable poundages.

Table 2 shows the variety and volume of the oxidation by-products that are expected to be produced at the Brownsville plant of Carthage Hydrocol. The main function of this plant will be the production of synthetic gasoline from natural gas by the Synthine process.

Table 2

Petrochemicals from the Synthine Process by Carthage Hydrocol

Name of Compound	Annual production Pounds
Acetaldehyde	9,100,000
Propionaldehyde	1,930,000
Normal butyraldehyde	3,750,000
Acetone	11,200,000
Methylethyl ketone	4,780,000
Methyl alcohol	730,000
Ethyl alcohol	63,680,000
Normal propyl alcohol	14,680,000
Normal butyl alcohol	4,370,000
Normal amyl alcohol	1,060,000
Acetic acid	24,700,000
Propionic acid	8,700,000
Butyric acid	8,200,000
Methylpropyl ketone	600,000
Total	157,200,000

In Table 2 note the large production, at this one factory, of the aldehydes, acetone, the alcohols and organic acids. These are indispensable organic chemicals that have heretofore been obtained from wood and grain. By their production from natural gas, the petrochemical industry makes another important, if indirect, contribution to conservation of food resources.

Table 3 will give an idea of the products that interest the strictly chemical enterprises that have entered the petrochemical field, the Dow Chemical Company which works on methane (in natural gas) and olefins obtained by cracking ethane and propane; and Shell Chemical Company which works on olefins obtained from refinery gases.

Some petrochemical enterprises have more limited programs or are devoted to a specialty. Among these are Tennessee Eastman of Kingsport, Tenn., which will produce ethyl hexyl alcohol made from synthetic ethyl alcohol; and the general chemical division of the Allied Chemical and Dye Corporation at Baton Rouge, La., which will make a line of organic fluorine or insecticidal dusts.

As regards the future, the petrochemical industry has not yet saturated its market, though its capability for attaining saturation is evident. At present its main raw materials are the olefin hydrocarbons from ethylene up the hydrocarbon scale. Ethylene, CH_2CH_2, is its most versatile material. A still more versatile material, acetylene, which is CH-CH, if it were obtainable cheaply enough, would open vast new petrochemical prospects. It may be that acetylene will become available through the Schoch electric process applied to natural gas.

Table 3

Principal Petrochemicals

Dow	Shell Chemical
Styrene	Ethyl alcohol
Ethylene glycol	Ethyl chloride
Diethylene glycol	Isopropyl alcohol
Triethylene glycol	Epichlorhydrin
Propylene glycol	Glycerine
Methylene chloride	Allyl alcohol
Ethylene dibromide	Allyl chloride
Ethylene dichloride	Butylene glycol
Carbon tetrachloride	Secondary butyl alcohol
Chloroform	Methylethyl ketone
Perchlorethylene	Methylisobutyl ketone
Hexachlormethane	Methylisobutyl alcohol

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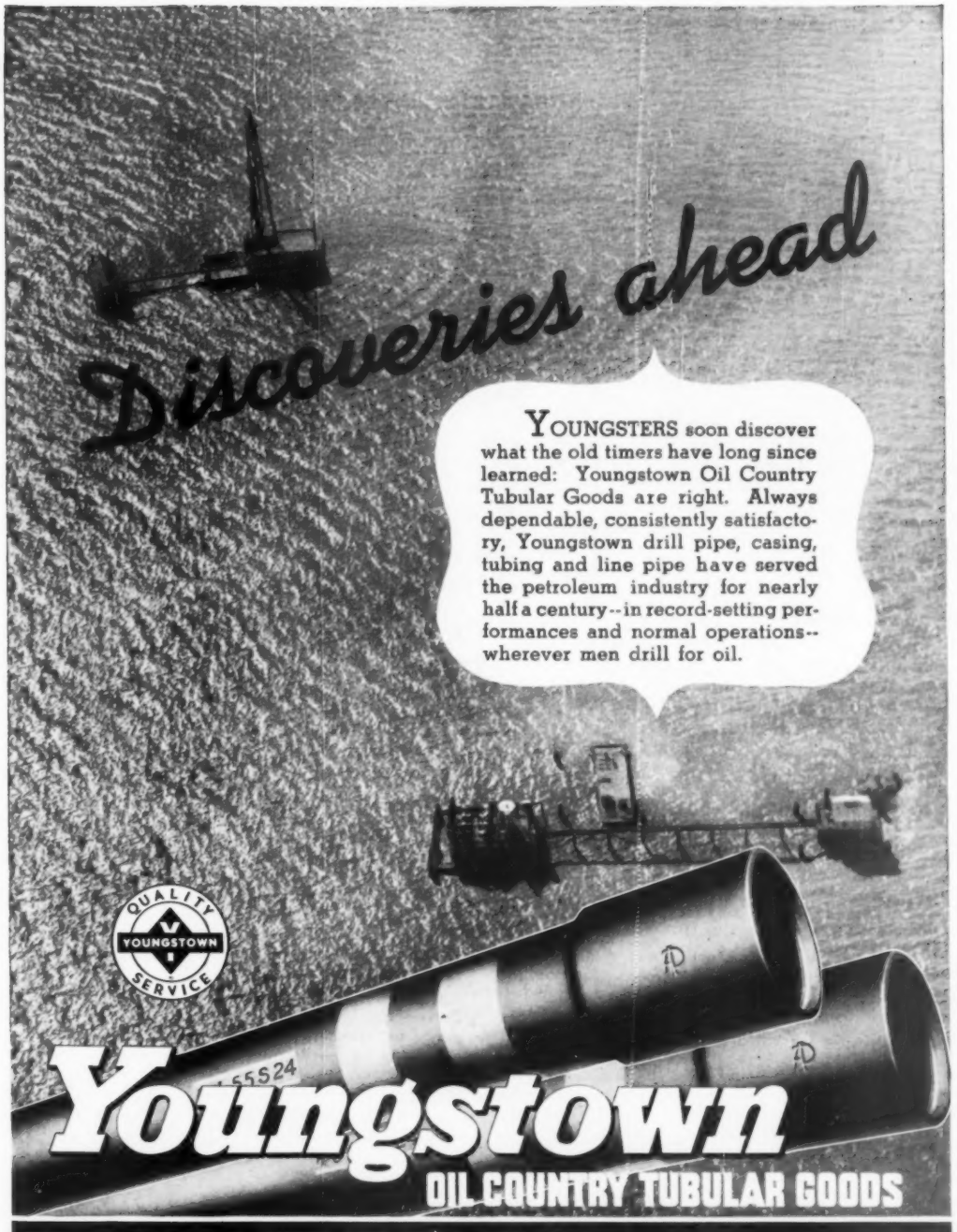
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N.B. While it is axiomatic that return on investment—the *ultimate earning power* of a refinery unit when actually on stream—is the only true evaluation of competitive engineering recommendations, initial plant costs remain a major factor in refiners' decisions on plant installations. M. W. Kellogg takes specific steps to *minimize initial plant costs* consistent with the achievement of *highest ultimate earning power*.

THOUSANDS SAVED BY CONVERTING OLD EQUIPMENT
Alkylation-Isomerization Unit
NEW METHODS SAVE THOUSANDS OF DESIGN HOURS
CUSTOMER SAVES 35% WITH NOVEL PRE-CAST WALLS
"TOP" PROCESS DESIGN BASIC TO LOW FIRST COSTS
SPECIAL PRE-HEATERS REDUCE WELDING TIME IN FIELD
Replace Gas-heaters, Assure Greater Protection for Welder
GIANT PIPE BENDER LOWERS "CAT" COSTS, SLASHES MAINTENANCE
Exclusive Kellogg Technique Bends Process Pipe in Sizes up to 96" O.D.
ANGLE LOPS $20,000 OFF COST SHEET
First to Use Guy Derricks, Kellogg Knows Value of Careful Planning
COSTS CUT 50% THROUGH USE OF KELCRETE
Kellogg Provides Vessel Refractory for about $4/sq. Installed!

. . . AND THAT'S NOT HALF THE STORY

Those eight headlines above, showing how Kellogg searches for methods of keeping down initial costs, give only an indication of the countless ways in which a closely integrated organization can save the customer money.

Sometimes the concepts themselves are not unusual, but the applications are novel. In other cases, exclusive equipment permits Kellogg to do a job better and less expensively. Frequently, the entire idea is a new one. Or, perhaps, it's just years and years of experience that makes the difference.

Kellogg has designed new types of furnaces, adapted war-born methods of insulation to refinery practice. It has improved means of installing pipeways and its construction department has also devised time-and-money-saving methods for steel construction.

Other improvements that mean money in the bank for the customer include new ways for fireproofing, simple means for removing heat exchanger bundles, special techniques for fabricating piping and numerous additional—often exclusive—design and construction features that all add up to major savings.

Economies such as these are only possible when backed, organized and controlled by a complete organization—like that of M. W. Kellogg—where all types of specialists are available for work on the myriad problems involved.

THE M. W. KELLOGG COMPANY

A SUBSIDIARY OF PULLMAN, INC.

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Dry Seal Lifter Roof
Improved Breather Roof
Lodek Floating Roof
Dry Seal Gasholder
Improved Balloon Roof

The Wiggins Lodek Floating Roof

. . . designed specially for the storage of corrosive oil products. The entire under surface being in complete contact with the tank contents, no vapors are trapped or can collect beneath the roof.

The basic exclusive conservation features of the Hidek Roof including the triple seal and extra large pontoons are retained.

Write for bulletin FR-3 which gives further details on Wiggins Lodek Floating Roofs.

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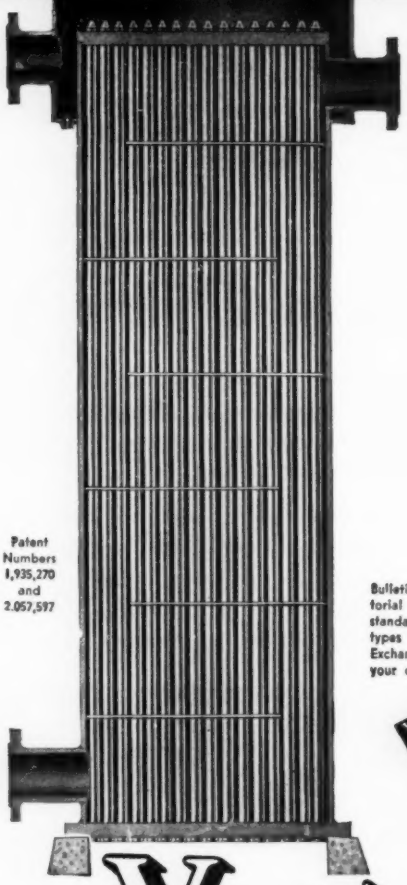
FILM TYPE EXCHANGERS

DETAIL SHOWING DISTRIBUTING FERRULE IN TUBE (Patent Pending)



Patent Numbers 1,935,270 and 2,057,597

Vogt engineers have taken a familiar refrigeration plant "old timer" and developed it into this modern, efficient heat exchanger.

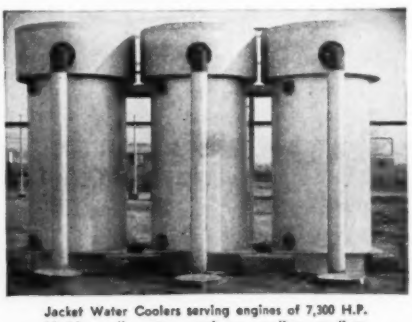
The film type exchanger operates in a vertical position. Water introduced in the top chamber is distributed in a thin film against the inner tube walls by means of special ferrules. The shell side of the exchanger has baffles arranged to provide optimum velocities, pressure drops, and heat transfer rates. Shutdowns are eliminated because tubes can be cleaned while the unit is in operation; thus permitting the use of dirty, mud and silt depositing water.

Vogt Film Type Exchangers now serve as Jacket Water Coolers, Sulphuric Acid Coolers, and Sulphur Dioxide Condensers, and can be designed to condense any vapor. They are also applicable for handling liquids other than water in film flow.

HENRY VOGT MACHINE CO., INC.
LOUISVILLE 10, KENTUCKY

Branch Offices: New York, Philadelphia, Cleveland, Chicago, St. Louis, Dallas

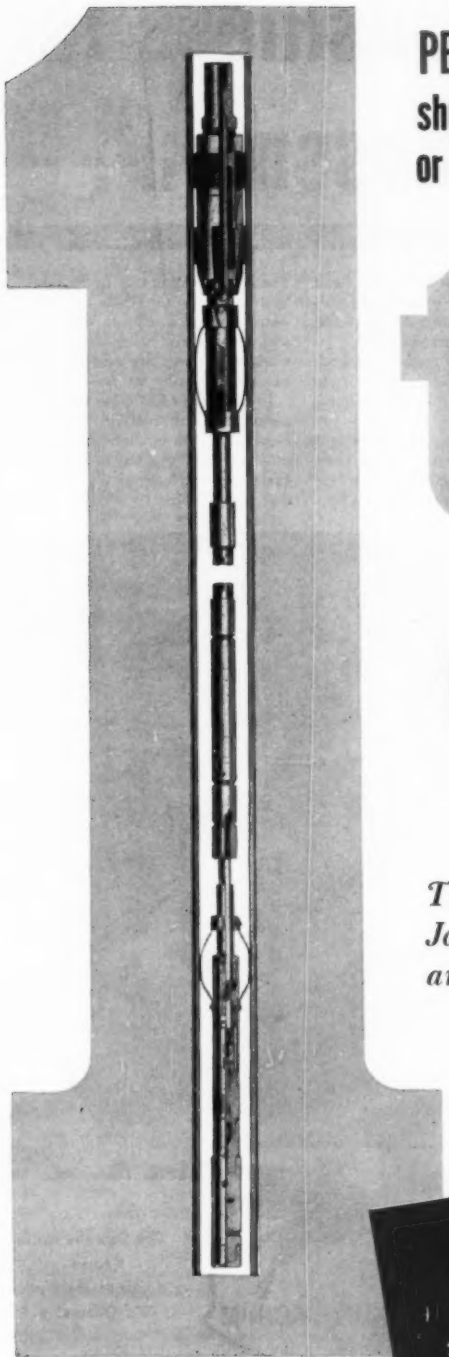
Bulletin HE-5 is a pictorial presentation of standard and special types of Vogt Heat Exchangers. Write for your copy.



Jacket Water Coolers serving engines of 7,300 H.P. Muddy well water used as cooling medium.

Vogt

HEAT TRANSFER EQUIPMENT



PERFORATE and TEST to secure water shut-off information - - do exploration - - or actual production work in one trip.

1 trip

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The same thing is true of Socony-Vacuum's modern laboratories—the advanced refining methods and equipment with which we work to produce the *most* product of *highest* quality at *lowest* cost.

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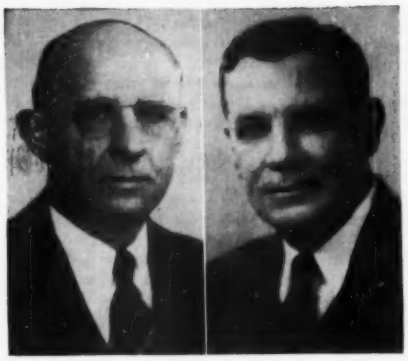
The Sign the Nation Knows . . . Builds as the Nation Grows!

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION



Left to right. C. W. Hamilton, Claude Woessner

Gulf Expands Foreign Production Staff

In view of the expanding activities of Gulf Oil Corporation outside the United States, a reorganization of the company's foreign production division on a hemispheric basis has taken place, as announced by Vice President E. C. Bothwell.

Overall supervision of Gulf's production interests abroad will continue to be the responsibility of Vice President C. W. Hamilton, operating from his headquarters in New York as has been the case since 1940. Assisting him is Claude Woessner as general manager of the foreign production division. His connection with Gulf began in 1927 when he joined the Venezuela Gulf Oil Company's production department. Since 1928 he has been stationed in the New York office.

Other appointments include Edward S. Bleecker, manager of Western Hemisphere operations; H. J. Wharton, assistant manager Western Hemisphere operations; R. E. Westling, executive assistant in charge of technical matters for Western Hemisphere operations; Chester A. Baird, assistant manager of East Hemisphere operations; and E. E. Ferrin, executive assistant in charge of technical matters for Eastern Hemisphere operations.

Peru Considering More Liberal Law

Reports from Lima state that Peruvian officials, acting upon recommendations of economists headed by Dr. Julius Klein, former Under Secretary of Commerce of the United States, are endeavoring to bring about the removal of price controls, the abolition of subsidies and the establishment of free exchange of currency as measures that will improve the country's economy by encouraging trade and investment. Part of the plan is to bring about the enactment of a new oil law which has been hanging fire for the past two or three years.

As outlined in these reports, the proposed law would open to exploration practically the whole country—the coast, the Montana and eastern area far beyond the Andes—with royalties of 12½ percent on production near the coast and declining to six and three percent applying to interior regions where transportation is more costly. Other provisions would include exemption of oil from export tax and permission to oil companies to retain all foreign exchange derived from exports. In the past attempts to pass a workable law have been blocked by nationalist and communist opposition, but it is felt that, in view of Peru's declining production and the growing requirements of domestic consumption, it may now be possible to obtain favorable action.

Oil Search In British Columbia

Search for oil and gas in British Columbia has been spurred by Imperial Oil's new well as Normandville, Alberta, about 100 miles east of the British Columbian border. Other sections of the province are being probed for oil. Royalite Oil Company has a rig en route to the Queen Charlotte Islands just south of the Alaska Panhandle.

Prospecting licenses have been issued to Royalite involving 18,600 acres in the gulf islands between Vancouver Island and the lower British Columbia mainland. These islands are in the main shipping lanes en route to Vancouver. Phillips Petroleum has started exploration in the Lone Mountain area where the company has an allocation of 14,720 acres. Contract for the first well has reportedly been let to Trinity Drilling Company of Dallas, Texas. This region is a foothill structure resembling Alberta's Turner Valley.

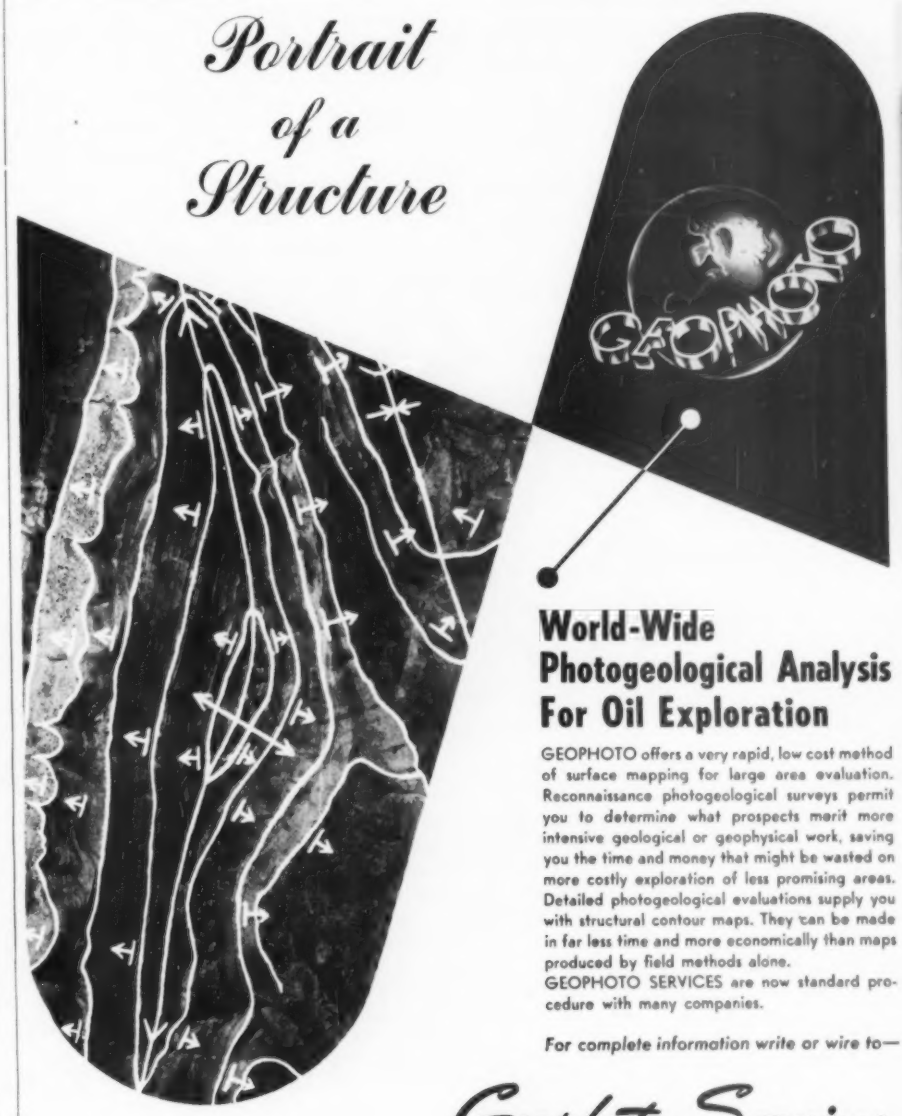
George A. Hill, Jr.

George A. Hill Jr., president of the Houston Oil Co., Houston, Texas, died Nov. 2 at a Greenville, South Carolina, hospital. Mr. Hill was taken ill Oct. 22 while enroute to a Washington meeting of the executive committee of the board of directors of the American Petroleum Institute. Mr. Hill was a member of the board of directors and a member of the executive committee of the Institute and was a former vice president of the national organization in charge of production.

Thanksgiving In Arabia

Plump turkeys from the United States arrived in Saudi Arabia early in November, enabling employees of Arabian American Oil Company to observe a traditional Thanksgiving. A shipment is shown above en route from the pier at Ras Tanura to the company store at Dhahran.

Portrait of a Structure



World-Wide Photogeological Analysis For Oil Exploration

GEOPHOTO offers a very rapid, low cost method of surface mapping for large area evaluation. Reconnaissance photogeological surveys permit you to determine what prospects merit more intensive geological or geophysical work, saving you the time and money that might be wasted on more costly exploration of less promising areas. Detailed photogeological evaluations supply you with structural contour maps. They can be made in far less time and more economically than maps produced by field methods alone.

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Guy Warner, president of Standard Oil Company, Chile, and Mrs. Warner photographed on board the Grace Line's Santa Maria before sailing from New York November 4.

New Book

Petroleum Technology in 1946; edited by F. H. Garner, E. B. Evans and George Sell. Published 1949 by Institute of Petroleum, London, England; 445 pages, 27s 6d.

With this volume the Institute of Petroleum resumes annual publication of its Reviews of Petroleum Technology. The present volume covers in the main the year 1946, but the opportunity has been taken to include chapters which had to be omitted from the previous volume (1941-45). Probably most important of these is the chapter on lubricants and lubrication which for the period 1941-6 occupies 73 pages and contains references to over 1,000 articles in the literature and patent specifications. The present volume contains over 3,000 references to articles which have appeared in the literature in relation to developments in the periods reviewed and should prove a valuable source of information to all in the petroleum and allied industries.

Expands Cracking Capacity

Plans for a $4,500,000 expansion of catalytic cracking facilities at Cleveland refinery No. 1 were announced by E. B. McConnell, vice president in charge of manufacturing for Standard Oil Company (Ohio). The expansion will provide capacity within the range of 18,000 to 22,000 barrels of feed stock per day and is part of the $100-million three-year program of Sohio to provide more petroleum products for its customers.

Youngstown Superintendent

Ernest Holme has been promoted to superintendent of the Indiana Harbor rolling mills of The Youngstown Sheet and Tube Company. Earlier this year Mr. Holme, a roller, was appointed assistant superintendent of the mills. He succeeds J. M. Mitchell who left the company. Mr. Holme joined the company at the age of 18 as weighmaster at the 10-inch skelp mill, a unit of the rolling mills, and has risen through the ranks, serving on line jobs as charger and heater helper.

New Pumping Unit

Recently announced by Cabot Shops, Inc., Pampa, Texas is a new small pumping unit feature stroke length up to 20". An important advantage of this new Cabot Unit is that it will accommodate either a slow speed internal combustion engine or an electric motor. The new T2LU series is offered with a variety of structures, reducers, bearings and accessories. Jones & Laughlin Supply Co. is exclusive domestic distributor.

Develops New Straight-Pull Jar

Shaffer Tool Works has announced production of a new straight-pull adjustable jar for fishing and light drilling. The tripping mechanism does not depend upon friction for blow but uses a flat-disc spring unit so that the jar strikes steady, unvarying blows at whatever adjustment the tool is set, regardless of the type of fluid in the well. It is not necessary to place torque in the drill string in order to trip the tool.

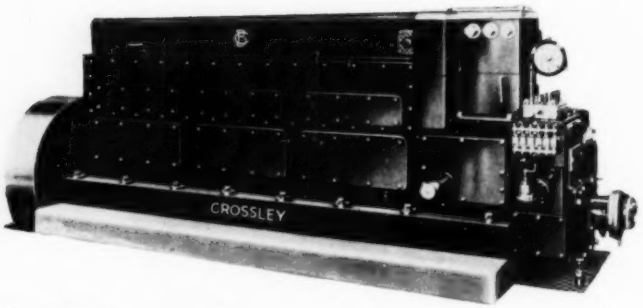
Brian R. Muirhead

Brian R. Muirhead, vice president and treasurer of Universal Oil Products Company, Chicago, died suddenly on October 20 while enroute to Detroit, Michigan, on a business trip. Mr. Muirhead was treasurer of Arkansas Natural Gas Corp., Shreveport, La., prior to 1945 and was particularly active in connection with the construction of petroleum defense plant facilities during World War II. He served as a flier in World War I. He was a lifetime friend and close associate of David W. Harris, president of Universal.

LPG Advertising Campaign

The National Committee for LP-Gas Promotion is undertaking a campaign to encourage the use of LPG products on which it is proposed to spend $500,000 to $1,000,000 the first year. John C. Pankow, director of sales, Detroit-Michigan Stove Co., is chairman of the group, and M. L. Trotter, president, Carolina Butane Gas Co., Columbia, S. C., is vice chairman. Robert E. Borden, Chicago, is secretary.

when it's "POWER PER SQUARE FOOT"



When installing Independent Power in an existing factory, space for the engine house is often at a premium. "Crossley's" outstanding performance, the result of Exhaust Pulse Pressure Charging and a scavenge efficiency of 90% has provided an exceptionally high power-space ratio which has solved many difficult installation problems.

Crossley engine types for various applications range from 10 to 3,000 B.H.P.

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STAND ALONE

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Complete selection in refinery piping
. . . on one order to CRANE

It's good to remember that Crane can supply all refinery piping needs on one order. A good example is this **Suction and Discharge Piping**—all valves, fittings, pipe and accessories are available from Crane. And no one can give you faster service than Crane, through a network of local Branches co-operating to serve you—and having direct access to large factory stocks.

So why not rely, as so many oil men do, on this **Single Source of Supply** to simplify all piping procedures? **Complete Responsibility** on Crane for materials gives you better installations, avoids needless delays. **High Quality** in every item from the broad Crane line helps to assure dependable performance throughout your piping systems.

ONE SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

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Branches and Wholesalers Serving All Industrial Areas
In Great Britain: Crane Ltd., 45-51 Leman St., London E.1, England.
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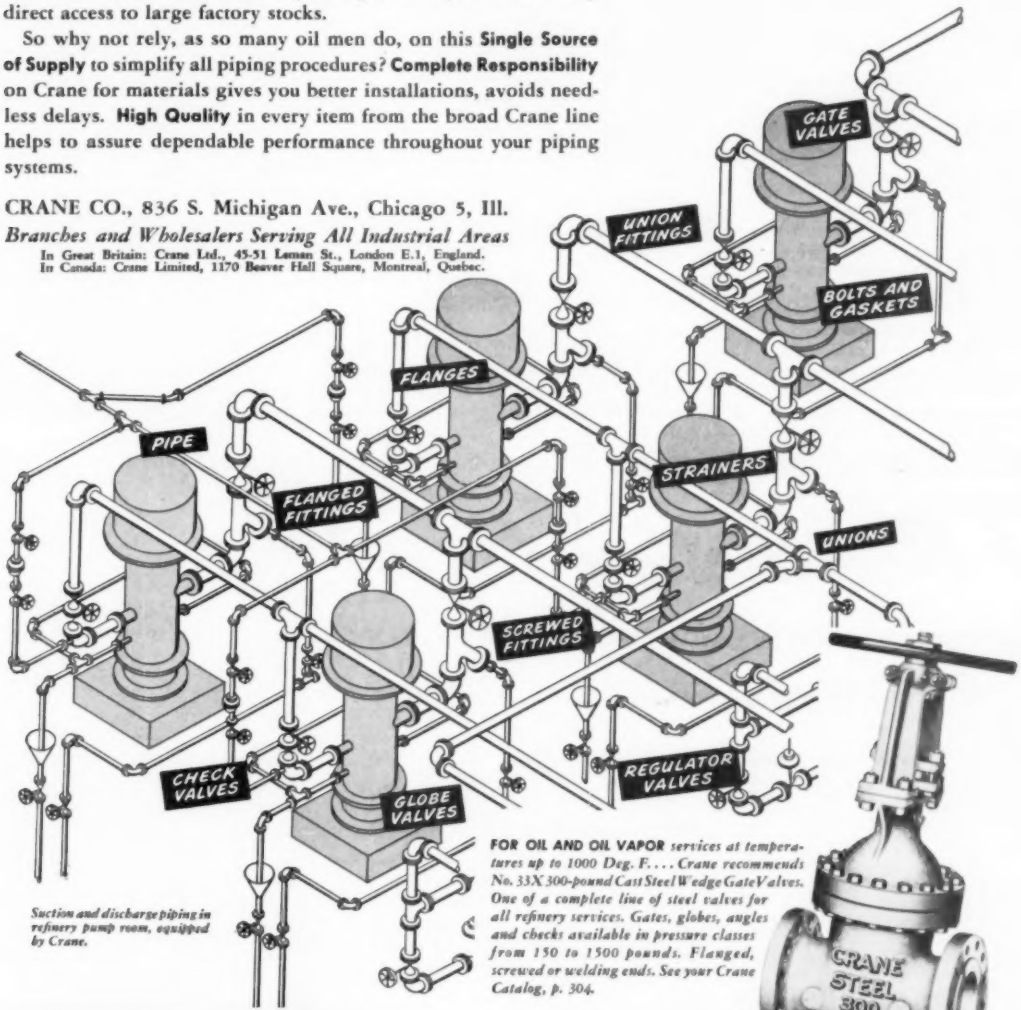

Suction and discharge piping in refinery pump room, equipped by Crane.

FOR OIL AND OIL VAPOR *services at temperatures up to 1000 Deg. F. . . . Crane recommends No. 33X 300-pound Cast Steel Wedge Gate Valves. One of a complete line of steel valves for all refinery services. Gates, globes, angles and checks available in pressure classes from 150 to 1500 pounds. Flanged, screwed or welding ends. See your Crane Catalog, p. 304.*

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FOR EVERY PIPING SYSTEM

Left to right: Julius A. Krug, Oscar L. Chapman

Chapman Heads Interior Department

Resignation of Julius A. Krug as Secretary of Interior early in November was followed by President Truman's prompt appointment of Under Secretary Oscar L. Chapman to the post. Mr. Krug succeeded Harold L. Ickes as Secretary in 1946 and during his term of office has been active in promoting cooperation between the government, through the department's Oil and Gas Division, and the 80-man National Petroleum Council representing all branches of the oil industry.

Mr. Chapman has been connected with the Interior Department for a number of years, first as Assistant Secretary and later as Under Secretary and is thoroughly familiar with the workings of the department. He played an active part in President Truman's campaign for reelection in 1948.

Venezuelan Production

Venezuelan production of crude oil during the month of June amounted to 38,912,767 barrels, an average of 1,297,092 barrels daily. For July total production was 40,905,976 or an average of 1,319,548 barrels daily. In August production rose to 42,717,565 barrels, averaging 1,377,986 barrels daily, and in September it again rose to 42,760,642 barrels, or an average of 1,425,355. Production by companies for the month of September is given in the following table:

Company	West	East	Total
Creole	13,540,479	4,845,177	18,385,656
Mene Grande	1,453,002	5,262,164	6,715,166
Shell	14,637,267	.....	14,637,267
Sinclair	.....	412,017	412,017
Socony	.....	1,118,208	1,118,208
Texas	.....	223,622	223,622
Mercedes	.....	479,063	479,063
B. C. O.	30,188	.....	30,188
Phillips	.....	216,491	216,491
Rexco	151,825	.....	151,825
Varco	.....	387,584	387,584
Guasare	3,555	.....	3,555
Total Barrels	29,816,316	12,944,326	42,760,642

Joseph T. Lockwood, Jr.

Joseph T. Lockwood Jr., 56, manager of the foreign shipping department of the Socony-Vacuum Oil Co. Inc., 26 Broadway, New York, died Oct. 11 in New York. He started in 1911 with the traffic department of the Standard Oil Company of New York and in 1915 was transferred to the order and shipping department where he remained until 1932 when it became Socony-Vacuum foreign shipping department.

1950 Patterson-Ballagh Catalog

Patterson-Ballagh, manufacturers of oil field specialties, has announced the availability of a 52-page catalog covering its complete line of equipment. The catalog includes protectors and stabilizers for drill pipe, wire line guides, wipers, both drill pipe and kelly, bumpers for travel block, links, swivel and crown. A complete description of mud guns and production items rounds out the Patterson-Ballagh catalog.

Freyermuth Heads OIIC

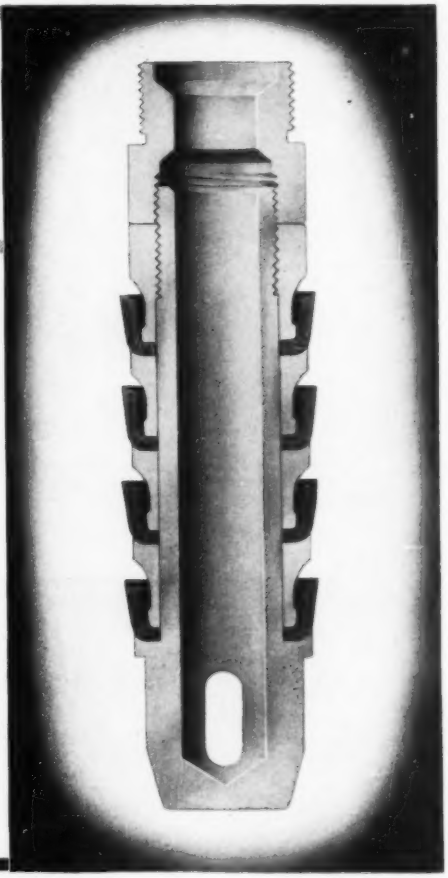
George Freyermuth, chief of the public relations department of Standard Oil Co. (N. J.), has been elected chairman of the Oil Industry Information Committee for the coming year, succeeding Conger Reynolds of Standard Oil Co. (Ind.) Appointments as vice chairmen include W. J. Gerwe of the Chicago office of Socony-Vacuum Oil Company Inc., Philip Humphrey of The Texas Company, New York, and Stanton Smith of Smith Oil and Refining Company, Rockford, Ill.

George Freyermuth

Cut Production Costs!

WITH TOUGH WEAR-RESISTING ANGUS CUPS

Angus Valves and Seating Cups are made from tough, wear-resisting "Gaco" Fabric composition. They have exceptional resistance to abrasive action, crude oils and gases, at high working pressures. Supplied in all A. P. I. standard sizes they are available in hard, medium and soft grades.



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TWICE THE STORAGE
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to seal Nordstrom valves automatically and continuously

Fully automatic lubrication for Nordstrom valves is here! Introduction of Rockwell *Hypermatic* lubricant marks the greatest advancement in the valve industry since the invention of Nordstrom valves 30 years ago. Hypermatic is the first and only genuine automatic lubricant. Now you can cut your valve maintenance cost because your lubrication crew need devote only 1/10, 1/20, 1/50, up to 1/100 as much time to re-lubrication. Your Nordstrom valves will give better service with less cost because each one will be automatically maintained in a condition of 100% lubrication, even in event of considerable neglect.

Leakage will be prevented because Hypermatic both seals and lubricates with split-second action and positive certainty. Almost twice as much Hypermatic can be compressed into the valve's lubricant chambers, permitting increased storage.

NOTHING TO BUY EXCEPT THE LUBRICANT—Instead of resorting to the use of extraneous devices or endeavoring to use variable line pressure, Hypermatic provides a new system of lubrication which gives the effect of a vastly improved valve design. You don't have to invest a single cent in mechanical devices. You don't even have to purge the old lubricant. Simply switch to Hypermatic and apply it to your present Nordstrom valves.

Your Nordstrom valves will use less Hypermatic than non-automatic lubricant.

ROCKWELL Hypermatic TRADE MARK LUBRICANT
Patents applied for
FOR NORDSTROM VALVES

IT COMPRESSES

Like the action of a door-check, Hypermatic compresses to a fraction of its volume when lubricant is energized.

IT EXPANDS

When the valve needs lubricant to seal a leak, Hypermatic expands and seals the valve seat. It feeds into any void instantly.

AUTOMATIC LUBRICATION

Greatest improvement in history of Nordstrom valves
— gives effect of improved design without mechanical change
Tried, tested, proved in laboratory, field and plant
Keeps Nordstrom valves in state of perfect lubrication

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Place your order immediately for this new, amazing automatic lubricant. A variety of types is available.

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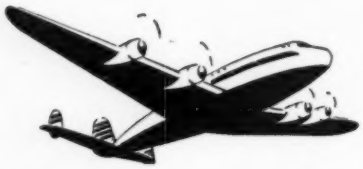

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CORROSION AND HEAT RESISTANCE. Oil field operations require parts that give the utmost in resistance to corrosion and wear. Places where alloy steels are used include drill bits, pumps, elevators and swivels.

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Alloy Steels
have these definite advantages:

An exceptionally high ratio of strength to weight is just one of the important advantages of Republic Alloy Steels. They resist wear better than any other material . . . and their resistance to corrosion and heat keeps equipment in good condition, reduces repair bills.

A wide range of uses includes those pictured at the left, as well as gears, shafts, locomotive forgings, power drills, stud bolts, wrenches . . . in fact, all parts that must be hard and strong.

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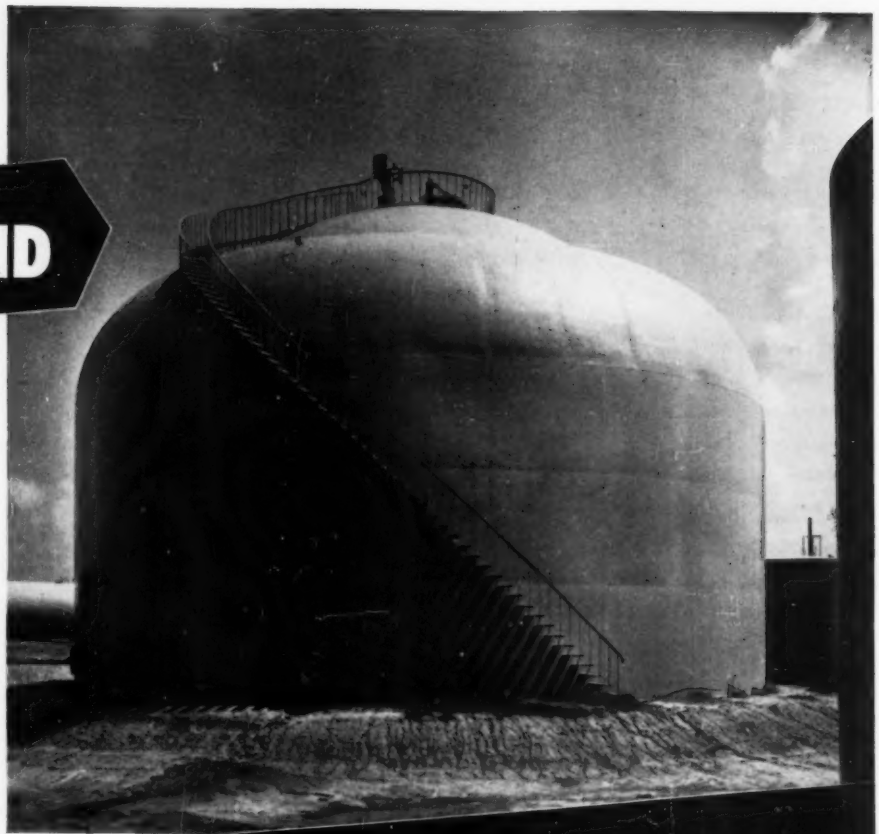

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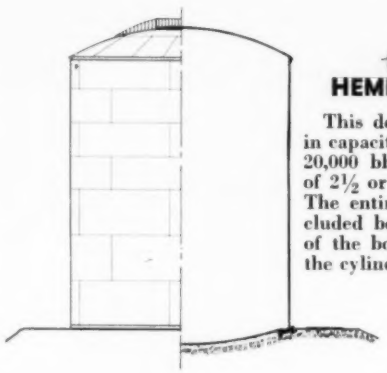

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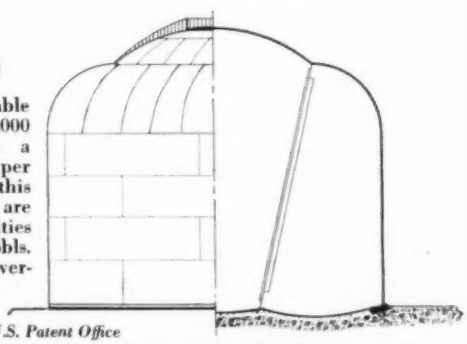

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The Hemispheroid *retains the quantity* of gasolines and other volatile petroleum products by reducing evaporation losses during storage. It is designed to withstand the pressure resulting from the maximum temperature attained by the liquid surface. Instead of venting, the Hemispheroid allows an internal pressure to build up until it is equal to the vapor pressure of the liquid in the tank. Vaporization of the liquid stops and no vapors escape as long as the internal pressure does not exceed the relief valve setting.

The Hemispheroid *maintains the quality* of volatile hydrocarbons because it prevents the escape of their lighter components. In the case of gasoline, these fractions are responsible for the easy starting and anti-knock properties that are so essential for improved engine performance. When they are lost, an inferior product remains. For example, a volumetric loss of only 1.0 per cent of motor gasoline is accompanied by a rise in the 10 per cent point of 5 degrees, Fahrenheit, and a loss in octane rating of one point.

When you use the Hemispheroid for storing and handling gasoline, you get the double-barreled benefit of protecting *quantity* and *quality* at the same time. Write our nearest office for more information.

Above: 20,000-bbl. Noded Hemispheroid storing natural gasoline at 2½ lbs. per sq. in. working pressure for the Carthage Corporation at Carthage, Texas.

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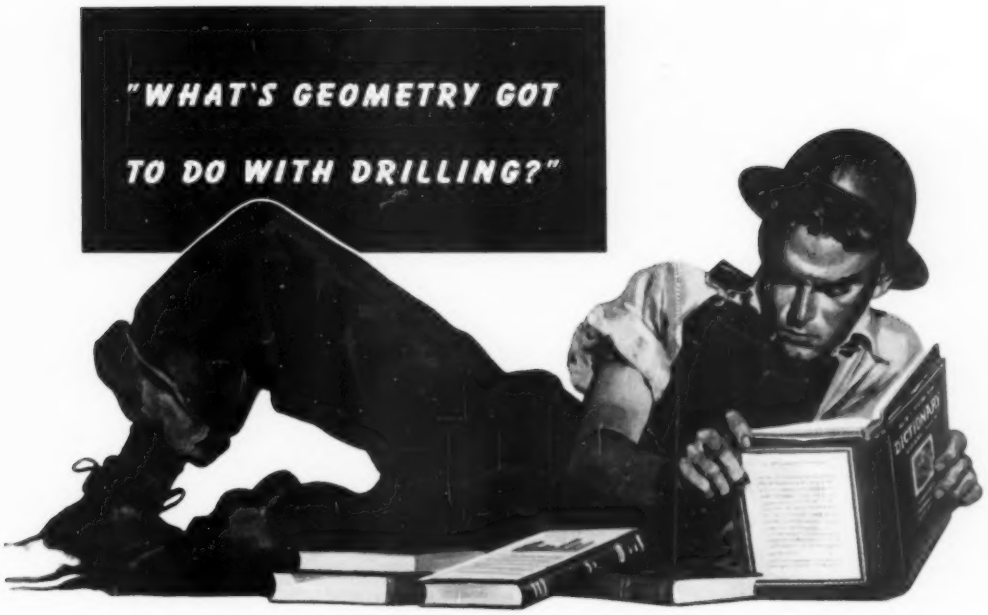

"Geometry plays an important part in successful hole making . . . in example, all Hughes tri-cones have the same basic geometry . . . 3-cone construction with chisel tooth arrangement and controlled action on bottom. This basic geometry provides such advantages as intermeshing rows of teeth on the inner portion of each cone for 'self cleaning' and also permits the use of deeper teeth and larger and stronger bearings. With this geometry only rolling cutting surfaces are exposed to bottom of hole. These points of advantage demonstrate geometry in action as applied by Hughes engineers to create another Hughes 'Engineered Solution.' "

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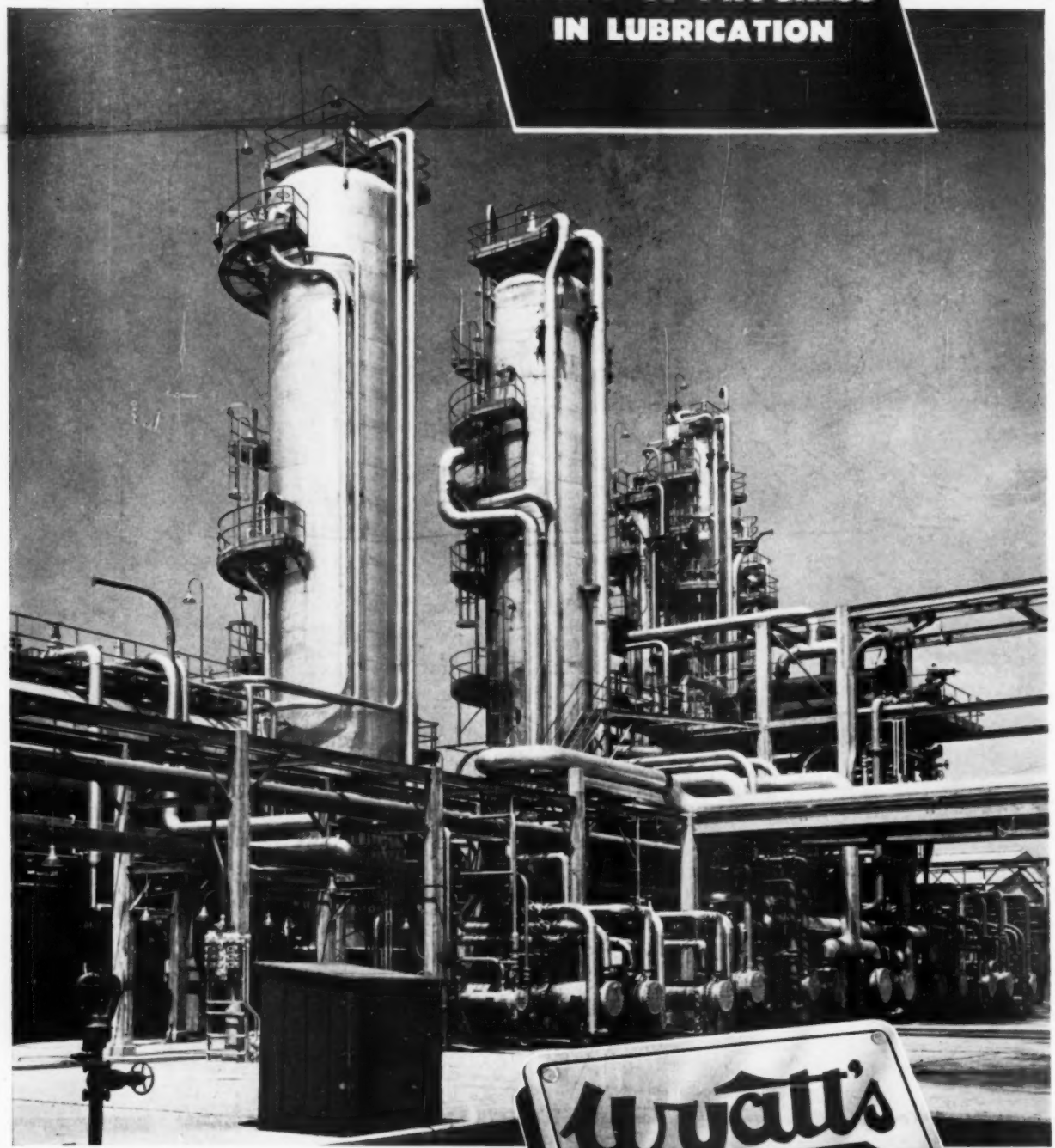

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